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Work Outcomes of Sickness Absence Related to Mental Disorders: A Systematic Literature Review

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Abstract

Background. Sickness absence is one of the most identifiable and costly types of losses related to mental disorders. Few cost of illness estimates specifically have taken sickness absences into account. To build the case for employers to invest in interventions that target sickness absences, it is important to identify the costs associated with them. The purpose of systematic literature review is to examine the current state of knowledge regarding the characteristics of sickness absences related to mental disorders that increase workplace burdens from the perspective of the employer.

Methods. A systematic literature search was performed using: *Medline Current*, *Medline In-process*, *PsycINFO*, *Econlit* and *Web of Science*. The search period covered 2002-2013. The systematic literature search focused on the sickness absence outcomes of workers with medically certified sickness absences related to mental disorders.

Results. A total of 3,820 unique citations were identified. Of these, 10 studies were identified whose quality ranged from good to excellent. The studies considered two characteristics of sickness absence: (1) whether and how long it took for a worker to return-to-work and (2) sickness absence recurrence. These studies suggest that these are two areas of workplace burden to employers.

Conclusions. The existing literature suggests that along with the incidence of sickness absence related to mental disorders, the length and recurrence (i.e., number and time between) of these sickness absences should be areas of concern. Thus, it may be important to evaluate interventions with respect to these two aspects of sickness absences.

ARTICLE SUMMARY

STRENGTHS AND LIMITATIONS OF THIS STUDY:

- Few studies have examined the current state of knowledge about sickness absence outcomes from the employer perspective; this paper examines the current state of knowledge regarding the characteristics of sickness absences related to mental disorders that increase workplace burdens from the perspective of the employer.

- This systematic literature review employed a broad search of five electronic databases: (1) *Medline Current*, (2) *Medline In-process*, (3) *PsycINFO*, (4) *Econlit* and (5) *Web of Science*. A hand search was also conducted. In total, 3,820 unique citations were identified and reviewed by two reviewers.

- All included studies were based on data from complete populations of people who had a sickness absence; this minimizes the potential for selection bias within populations.

- The results of this review suggest that along with the incidence of sickness absence related to mental disorders, the length and recurrence (i.e., frequency of recurrence and time between recurrence) of these sickness absences should be areas of concern. This highlights the importance of evaluating interventions with respect to these two aspects of sickness absences rather than focusing solely on whether a worker returns to work.

- The results of the search identified 10 papers that met inclusion criteria; this suggests that we are in the early stages of understanding the aspects of sickness absences that contribute to their burden and the areas to target to effectively decrease their costs.

Around the world, there is anxiety about the economic costs of mental disorders. Estimates suggest that a large share of the burden of mental disorders can be attributed to losses in work productivity. Between 30% and 60% of depression's cost is related to losses associated with decreased work productivity[1 2]. Decreased work productivity has been measured as work absences or an unproductive work day.

Because they take a societal perspective, most of the economic burden estimates for mental disorders rely on survey data (e.g., [1 3 4]). One of the most identifiable types of work absence is related to sickness absences. Few estimates specifically have taken sickness absences into account. Sickness absences are defined as work absences that require a medical certification and have an associated income replacement benefit. Yet, these specific types of absences are not only borne by society but employers in particular. Furthermore, because they involve the workplace, employers often assume the costs and responsibilities for the interventions to address sickness absences. Thus, to build the case for employers to invest in interventions that target sickness absences, it is important to identify the costs associated with sickness absences and where there can be cost-savings that interventions offer.

The concern among employers regarding mental disorders has been fueled by the recognition that sickness absence episodes related to a mental disorder are costly and their incidence is steadily rising[5]. Estimates suggest that an episode related to a mental disorder can be double the cost of one related to a physical disorder[6]. The total cost of sickness absences related to mental disorders is influenced by two factors: (1) the number of days absent and (2) the total number of sickness absences. The more sickness absence days, the greater the total cost of the sickness absence. In addition, high costs could be incurred with short sickness episodes if there are many repeat sickness episodes.

One approach to addressing the costs of sickness absence related to mental disorders could be to decrease the impact of these factors. This suggests that interest should extend beyond whether a worker returns-to-work (RTW). Rather, it is also important to understand the length and the frequency of sickness absence related to mental disorders. Few studies have examined the current state of knowledge about sickness absence outcomes from the employer perspective. To fill this gap, we conducted a systematic literature review to examine the sickness absence outcomes reported in the literature. These outcomes could help to identify the aspects of sickness absences that contribute to workplace burdens. Thus, for this review, outcomes were used to describe the characteristics of sickness absences related to mental disorders that add to workplace burdens. The purpose of this paper is to examine the current state of knowledge regarding the characteristics of sickness absences related to mental disorders that increase workplace burdens from the perspective of the employer. As such, this review is only a first step in understanding the aspects of sickness absences related to mental disorders that could escalate the costs that employers face. Results of this review can point to areas that sickness absence interventions could target. They can also suggest dimensions along which future intervention effectiveness could be evaluated as well as identify gaps in the literature.

METHODS

This systematic literature review used publically available peer-reviewed studies. It did not collect or use primary data. As such, it was not subject to research ethics board review.

Five electronic databases were searched for this systematic literature review: (1) *Medline Current* (an index of biomedical research and clinical sciences journal articles), (2) *Medline In-process* (an index of biomedical research and clinical sciences journal articles awaiting indexing into *Medline Current*), (3) *PsycINFO* (an index of journal articles, books, chapters, and dissertations in psychology, social sciences, behavioral sciences, and health sciences), (4) *Econlit*

(an index of journal articles, books, working papers and dissertations in Economics) and (5) *Web of Science* (an index of journal articles, editorially selected books and conference proceedings in life sciences and biomedical research). A search strategy was developed and executed for each database with a professional health science librarian (SB) (Supplementary File 1 - Search Strategy). *Medline Current*, *Medline In-process* and *PsychINFO* were searched using the *OVID* platform. *Econlit* and *Web of Science* were searched using the *ProQuest* and *Thomson Reuters* search interface, respectively. The search was completed between February 2013 and March 2013 and was limited to English language journals published between 2002 and 2013.

Eligibility Criteria

The systematic literature search focused on the characteristics of sickness absences of workers with medically certified sickness absences related to mental disorders. Sickness absence encompassed sick leave, short-term disability leave and long-term disability leave. These sickness absence benefits could be either publicly or privately sponsored. Their receipt was conditional on employment and the absence benefit was claimed with the intention of continued employment. We included studies that looked at "no cause" sickness absences such that it was not compulsory that the absence was work-related. The search focused on identifying articles about working adults between 18-65 years old who had a sickness absence related to a mental disorder. Sickness absence outcome terms (i.e., length of sickness absence, return to work, etc.) were not included in the search strategy. This was done to ensure all reported sickness absence outcomes in the literature would be captured. The reference lists of relevant studies were hand searched. Intervention studies, review articles and commentaries were excluded.

A multi-phase screening process was employed. The first phase involved screening titles. Citations that passed the first phase were evaluated for relevance based on their abstracts.

Finally, those that passed the abstract screen were evaluated for content based on the full-text. The multi-phase screening process was completed independently by two reviewers, CSD and DL. The chance agreement corrected inter-rater reliability was 0.92. Articles for which there were rater disagreements were discussed until consensus was reached.

The following eligibility criteria were used in each phase:

1. The study reported on medically certified sickness absences due to mental disorders.
2. The study sample is not from a select (i.e., clinical trial) population.
3. The study analyzed data that were collected in the year 2000 or later.
4. The study reported on sickness absence outcomes directly related to a specific absence.

Sickness absence outcomes considered for this review included length of sickness absence, not returning to work (i.e., quitting, retiring), transitioning to long term disability, returning to work, and sickness absence recurrence.

Because the 1990s was a period of global change in disability policies and accounting for publication lag, the year 2002 was used as an inclusion starting point[7]. We focused on the last decade because there were relatively fewer policy changes related to workers during this time. Studies using pre-2000 data were excluded because pre-2000 data were collected within systems that existed before many of the 1990s policy changes.

Quality Assessment

Articles that passed the three-stage screening process were then assessed for quality using the following criteria:

1. The study population is well described.
2. The data source is well described.
3. The study sample is representative of all workers in the context.

4. Mental disorders are included and reported.
5. The system of diagnosis/classification is described.
6. The sickness absence criteria are reported (i.e., pre-sickness absence days to qualify for sickness absence).
7. Sickness absence outcome measures are defined.
8. Analytical methods are described.
9. Uncertainty of estimates are reported.
10. The stated research objective is met.

One point was awarded for each criterion that was met; the maximum score was 10. Total scores between 1 and 4 points were categorized as *fair/weak* quality, those between 5 and 8 points were *good* and those between 9 and 10 points were *excellent* quality.

RESULTS

Description of Inclusion and Exclusion

The electronic literature search resulted in the identification of 3,820 unique citations (Figure 1). From these, 24 entries that were commentaries were excluded. Based on the title review, 3,577 citations were excluded. Based on abstract review, another 151 citations were excluded; this left 64 articles for full-text review. After the full-text review, 10 articles remained and their reference lists were hand searched for relevant studies. Four articles were identified in the hand search process but all were excluded during full-text review. Reasons for article exclusions were because they: (1) used pre-2000 data (n = 11), (2) did not report sickness absence outcomes directly related to a specific absence (n = 3), (3) were based on select populations (n = 44).

Insert Figure 1

Quality Assessment

Upon quality assessment, 5 of the 10 studies were rated as *excellent* and the remaining 5 as *good* (Supplementary File 2 - Quality Assessment). The identified limitations of these studies included: non-representativeness of the working population (n = 10), outcome measure not defined (n = 4), and uncertainty of the estimate not reported (n = 3).

Overview of the Studies

Table 1 contains the descriptions of the included studies. All of the included studies used administrative data from either an employer, insurer or occupational healthcare provider. As a result, none of the studies relied on self-report. They were based on objective data to identify populations of people with a sickness absence.

Of the 10 included studies, five were from the Netherlands. Two were from Brazil, two were from Canada and another from the UK. Seven of the studies used data from single employers. The employers in the studies represented a variety of sectors in several countries including a Dutch national postal service and a telecommunication company[8-10], a Brazilian hospital[11], a Canadian resource sector organization[6 12] and a British police force[13]. The four exceptions were Barbosa-Branco et al.[14] whose study included all Brazilian workers in registered private sector companies. In addition, Koopman et al.[15] and Roelen et al.[16] based their studies on data from an occupational health provider representing a broad spectrum of firms across the Netherlands.

All of the studies except one indicated that they used the International Classification of Diseases (ICD) to identify type of disorder. Of those that used the ICD, eight of the studies used the 10th edition; one used the 8th edition. One study[15] did not describe the disorder classification system that was used. However, because it used ArboNed data that were also used by Roelen et al.[16], it might be assumed that ICD codes were also used in this study.

Among the studies, there was variability in the scope of the primary diagnoses associated with the sickness absences that were included. However, there were similarities with respect to the inclusion of depressive and anxiety disorders and stress-related disorders. Thus, there appeared to be consistency among the studies with regard to a core set of mental disorders.

There was variation with regard to the number of absence days needed to qualify for sickness absence benefits. The number of days ranged from one to three weeks.

Table 1. Overview of Studies

Author(s)	Country	Study Population	Data Source(s)	Years of Data	Diagnostic Classification System Used	Sickness Absence Benefit Definition	Outcomes
Barbosa-Branco et al. (2012)	BR	All employees in registered private sector jobs in 2008 who a sickness absence	Brazilian National Social Security Administrative Databases: National Benefits System and National Social Information Database	2008	International Classification of Diseases,10th edition (ICD-10)	Sickness absence = ≥ 15 medically certified consecutive days absent	Duration of sickness benefit claim (calendar vs work days not specified)
Board & Brown (2011)	UK	Study sample consisted of all employees of one police force who had ≥ 1 episode of long-term sickness absence (LTSA) between Nov 1, 2000 and Oct 31, 2002	Employer electronic absenteeism record administrative data	2000-2002	International Classification of Diseases,8th edition (ICD-8)	Long-term sickness absence = medically certified sickness absence episodes ≥ 28 consecutive calendar days	Return to work by type of sickness absence episode (sub-acute or chronic)
Dewa et al. (2010)	CA	Employees from one large resource sector company from 2003-2006 who had a sickness absence	Employer administrative sickness absence data	2003-2006	ICD-10	Sickness absence = medically certified sickness absence of ≥ 5 continuous work days	Mean work days per sickness absence episode
Dewa et al. (2011)	CA	Employees from one large resource sector company from 2003-2006 who had a sickness absence	Employer administrative sickness absence data	2003-2006	ICD-10	Sickness absence = medically certified sickness absence of ≥ 5 continuous work days	Sickness absence free days

Author(s)	Country	Study Population	Data Source(s)	Years of Data	Diagnostic Classification System Used	Sickness Absence Benefit Definition	Outcomes
Koopmans et al. (2008)	NL	Employees of firms who were clients of one occupational health services provider from April 2002 – November 2005 who had a sickness absence.	Administrative sickness absence data from one occupational health service provider (ArboNed)	2002-2005	Not described	Not described	Return to work Duration of absence calendar days
Koopmans et al. (2010)	NL	Dutch Post and Telecommunication employees from 2001-2007 who had a sickness absence due to a common mental disorder since Jan 1, 2001 or date of employment	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sick leaves of > 3 weeks require a medical certificate from an occupational physician	Duration of sickness absence days (calendar vs work days not specified) Days to sickness absence recurrence
Koopman et al. (2011)	NL	Dutch Post and Telecommunication employees from 2001-2007 who had a sickness absence due to a common mental disorder	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sick leaves of > 3 weeks require a medical certificate from an occupational physician	Duration of sickness episodes Median duration in months until recurrence of sickness absence Days to sickness absence recurrence Recurrence = the start of at least one new episode of sickness absence after complete return to work for ≥ 28 days
Reis et al. (2011)	BR	Workers who worked ≥ 20 hours/week from one university hospital who were employed from 2000-2007 who had at least 1 sickness absence	Administrative data from employer human resources department	2000-2007	ICD-10	Not described	Median calendar days per sickness absence Recurrence density of sickness absence episodes/100 worker-months
Roelen et al. (2009)	NL	Employees of firms who were clients of an occupational health services provider from 2001-2007 who had a sickness absence	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sickness absence: absence of ≥ 28 sick days requiring a medical certificate from an occupational physician	Median number of calendar days of sickness absence episodes/100 employees

Author(s)	Country	Study Population	Data Source(s)	Years of Data	Diagnostic Classification System Used	Sickness Absence Benefit Definition	Outcomes
Roelen et al. (2010)	NL	Dutch Post and Telecommunication employees from 2001-2007 who had a sickness absence	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sick leaves of > 3 weeks require a medical certificate from an occupational physician.	Median duration of sickness absence in days (type of day not specified) Recurrence density of sickness absence/1,000 worker-years Days to recurrence

Sickness Absence Outcomes

The outcomes reported by the studies could be grouped into two general categories. The first outcome category includes studies that examined whether and when a worker returned to work. They included RTW indicators and sickness absence duration. The second category of outcomes focused on sickness absence recurrence. These recurrence outcomes reflected the rates of recurrence as well as the time between sickness absence episodes.

Outcomes focusing on Return-to-Work. Three studies reported the rates of RTW (Table 2). Koopmans et al.[15] observed that of workers who had sickness absences due to depression, 66% returned to work within a year. Board and Brown[13] found that among their police force, 85% of police officers who had a sickness absence returned to work.

Duration of sickness absence. Duration of sickness absence was measured using three types of days – calendar days, work days and unspecified types of days. Sickness absence days were reported using two statistics – the mean days and the median days. The values of the mean and the median become equivalent when a distribution is symmetric (e.g., the normal distribution). From the Netherland studies, the median days of absence duration were between 79 and 119 days[8-10 15 16]. In addition, there were changes in the median number of days over time

such that they seemed to decrease between 2001 and 2007[16]. From Brazil, Reis et al.[11] reported a duration of 5-7 calendar days. Using Canadian data, Dewa et al.[6] reported a mean absence episode of 65 work days. From the UK, Board and Brown[13] found that 43-60% of the workers they observed had a sickness absence episode that was between 28-90 days; about 41-57% had sickness absence episodes that lasted more than 90 days.

Table 2. Return-to-Work Sickness Absence Outcomes

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Barbosa-Branco et al. (2012)	BR	Mental and behavioural disorders: Organic disorders (ICD-10 F00-F09); psychoaffective substance use disorders (ICD-10 F10-F19); schizophrenia, schizotypal and delusional disorders (ICD-10 F20-F29); mood disorders (ICD-10 F30-F39); stress-related and somatoform disorders (ICD-10 F40-F48)	Duration of sickness benefit claim = measure not described	Number of claims due to mental and behavioural disorders: All = 147,105 Males = 71,195 Females = 75,910	Median duration of disability episodes (in days) (1st and 3rd quartiles): Males: Mental and behavioural disorders = 76 (47, 113) Females: Mental and behavioural disorders = 65 (43, 97)
Board and Brown (2011)	UK	ICD categories used not described	Absence phase: Sub-acute = 28-90 days Chronic phase = > 90 days Return-to-Work = episode has start and finish dates before study end date	Number of sickness absences: Police officers = 4,485 Civilian staff = 1,761	Among those with mental ill health: Police officers: With sub-acute episode = 43.2% With chronic episode = 56.8% Who return to work = 85.2% Civilian staff: With sub-acute episode = 59.5% With chronic episode = 40.5% Who return to work = Not reported
Dewa et al. (2010)	CA (Ontario)	Mental and behavioural disorders (ICD-10 F00-F99, Z502, Z503, Z561-Z566, Z630-Z639, Z729, Z733, Z738, Z864, Z915): schizophrenia, mood disorders, stress-related disorders and mental and behavioral disorders due to psychoactive substance use	Duration of episode = number of work days absent	Number of sickness absences: Due to any disorder = 4,791 Due to mental and behavioural disorders = 698	Mean days per episode (in days) (95% Confidence Interval): Due to any disorder = 33.0 (31.3, 34.7) Due to mental and behavioural disorders: All = 64.9 (58.2, 71.6) Males = 62.1 (54.1, 70.1) Females = 70.0 (57.8, 82.1)

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Koopmans et al. (2008)	NL	Depression (Diagnostic classification system not descripted in paper)	Duration of episode = number of calendar days between first day of sick leave and date of return to work or disability pension received	Number of new episodes due to depression = 9,910	Return to work within a year: Men = 67.7% Women = 64.8% Total = 66.2% One year of work incapacity: Men = 15.2% Women = 17.4% Total = 16.4% Mean duration of episode (in days) (95% CI): Men = 200 (196, 204) Women = 213 (210, 217) Median duration of episode (in days) (95% CI): Men = 179 (172, 186) Women = 201 (193, 209)
Koopmans et al. (2010)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32.0, F32.1, F40.0, F40.1, F40.2, F41.0, F41.1, F41.2, F41.3)	Duration of sickness absence = number of calendar days between first day of sick leave and date of return to work or disability pension received	Number of employees with ≥ 1 sickness absence due to CMD = 8,951 Total number of sickness absence due to CMD = 10,921	From 2001-2007, median duration of index sickness absence episode (in days) (95% CI): Men: Stress = 49 (47, 51) Psychiatric = 168 (150, 186) Total CMD = 57 (54, 60) Women: Stress = 56 (53, 59) Psychiatric = 168 (151, 185) Total CMD = 67 (63, 71) From 2001-2007, median duration of recurrent CMD sickness absence episodes (in days) (95% CI): Men: Stress = 46 (41, 51) Psychiatric = 68 (39, 97) Total CMD = 48 (43, 53) Women: Stress = 60 (51, 69) Psychiatric = 73 (53, 93) Total CMD = 62 (55, 69)
Koopmans et al. (2011)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32, F40, F41)	Duration of sickness absence = number of calendar days of sickness absence adjusted for partial return to work and annual worker- years	Number of employees with ≥ 1 sickness absence due to CMD = 9,904 Total number of sickness absences due to CMD = 12,404	From 2001-07, duration of sickness absence episode due to CMD (in calendar days) (95% CI): Total = 62 (60, 64) Men = 57 (55, 59) Women = 68 (65, 71)

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Reis et al. (2011)	BR	Mental and behavioral disorders (ICD-10 F00-F99)	Duration of episode = Number of calendar days absent from work	Number of sickness absence episodes: Due to any disorder = 5,138 Due to mental and behavioural disorders = 324	Median duration of sickness absence leave (in days): First episode: Due to any disorder = 2 Due to mental and behavioural disorders = 5 Recurrent episodes: Due to any disorder = 2 Due to mental and behavioural disorders = 7
Roelen et al. (2009)	NL	Mental and behavioral disorders (ICD-10 R45, F43, F32, F40 and F41) from medical certification: emotional disturbance, depressive disorders, anxiety disorders and stress-related disorders	Duration of sickness absence = calendar days between the first and last day of sickness absence	Number of sickness absence episodes: Due to any disorder: 2001 = 90,095 2002 = 104,193 2003 = 118,926 2004 = 129,024 2005 = 128,044 2006 = 108,901 2007 = 96,482 Due to mental and behavioural disorders: 2001 = 21,140 2002 = 22,803 2003 = 24,917 2004 = 27,533 2005 = 22,682 2006 = 20,013 2007 = 18,513	Median duration of sickness absence episodes (in days) (95% CI): Due to any disorder: 2001 = 73 (72, 74) 2002 = 63 (62, 64) 2003 = 57 (56, 58) 2004 = 53 (53, 53) 2005 = 45 (45, 45) 2006 = 49 (48, 50) 2007 = 55 (54, 56) Due to mental and behavioural disorders: 2001 = 119 (116, 122) 2002 = 98 (96, 100) 2003 = 87 (85, 89) 2004 = 80 (79, 81) 2005 = 79 (77, 81) 2006 = 83 (81, 85) 2007 = 87 (85, 89)
Roelen et al. (2010)	NL	Mental and behavioral disorders (ICD-10 F00-F99) from medical certification	Duration of sickness absence = number of days between first day of sick leave and date of return to work or disability pension received	Number of employees with ≥ 1 sickness absence = 36,342 Number of employees with ≥ 1 sickness absence due to mental and behavioural disorders = 7,197 Number of employees with > 1 sickness absence due to mental and behavioural disorders = 1,400 Worker-years = 363,461	Median duration of sickness absence (in days) (95% CI): Mental and behavioural disorders = 62 (55, 69) Any disorder = 35 (34, 36)

Four of the studies compared sickness absence episode duration for those related to

mental disorders versus those for other disorders. The findings among the four studies were consistent; episodes for mental disorders were longer than episodes related to other types of disorders. For instance, Roelen et al.[10] reported that while the median duration of a mental disorder related episode was 62 days, it was 35 days for any type of episode. In addition, this pattern appeared to be consistent from 2001 to 2007[16]. Among their Canadian energy sector workers, Dewa et al.[6] found that the mean number of work days of an episode related to a mental disorder was almost double that of an episode related to other types of disorders (65 days versus 33 days). Reis et al.[11] reported similar patterns among their sample of Brazilian healthcare workers.

Outcomes Focusing on Sickness Absence Recurrence. Three of the studies reported rates of sickness absence recurrence related to a mental disorder (Table 3). Roelen et al.[10] reported recurrence rates of 80/1000 worker-years for mental and behavioural disorders as opposed to 82/1000 worker-years for any disorder. Reis et al.[11] found rates of 7/100 worker-months for mental and behavioural disorders and 17/100 worker-months for any disorder. In addition, Koopmans et al.[9] observed mental disorder sickness absence recurrence rates of 76/1000 worker-years for men and 79/1000 worker-years for women. They also found that 18% of workers with at least one sickness absence episode had a recurrent episode[9].

Table 3. Recurrence Sickness Absence Outcomes

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Dewa et al. (2011)	CA (Ontario)	Mental and behavioural disorders (ICD-10 F00-F99, Z502, Z503, Z561-Z566, Z630-Z639, Z729, Z733, Z738, Z864, Z915): schizophrenia, mood disorders, stress-related disorders and mental and behavioral disorders due to psychoactive substance use	Disability free days = number of between end of first episode and beginning of subsequent episode	Number of employees with ≥1 sickness absence episode: Due to mental disorders = 422 Due to physical disorders = 3,171	Median disability free days (standard error): Previous episode for mental disorders = 673 (79.8) Previous episode for physical disorders = 1053 (48.6)

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Koopmans et al. (2010)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32.0, F32.1, F40.0, F40.1, F40.2, F41.0, F41.1, F41.2, F41.3)	Recurrence density = number of employees with recurrent episodes by the worker-years in the sub-population of men and women with a previous episode of sickness absence due to a CMD New episodes = > 28 days apart Worker-years = years of coverage from index episode to end of employment period	Number of employees with ≥ 1 sickness absence due to CMD = 8,951 Total number of sickness absence due to CMD = 10,921	From 2001-2007, episodes per worker with ≥ 1 sickness absence related to CMD: 1 episode = 82% 2 episodes = 14% 3 episodes = 3% ≥ 4 episodes = 1% From 2001-07, CMD recurrence densities/1,000 worker-years (95% CI): Men: Stress = 74.4 (72.9, 76.0) Psychiatric = 83.8 (71.9, 95.7) Total CMD = 75.6 (70.7, 80.4) Women: Stress = 78.4 (75.9, 80.9) Psychiatric = 78.9 (64.1, 93.7) Total CMD = 78.5 (72.4, 84.6) From 2001-07, CMD sickness absence median time to onset recurrence (in months) (95% CI): Men: Stress = 11 (11, 13) Psychiatric = 12 (8, 15) Total CMD = 11 (10, 13) Women: Stress = 11 (9, 12) Psychiatric = 10 (8, 12) Total CMD = 10 (9, 12)
Koopmans et al. (2011)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32, F40, F41)	Recurrence density = number of employees with recurrent episodes by the worker-years in the sub-population of men and women with a previous episode of sickness absence due to a CMD Worker-years = years of coverage from index episode to end of employment period	Number of employees with ≥ 1 sickness absence due to CMD = 9,904 Total number of sickness absences due to CMD = 12,404	From 2001-07, CMD sickness absence median time to onset recurrence (in months) (95% CI): Total = 10 (10, 11) Distress symptoms = 11 (10, 12) Adjustment disorder = 11 (9, 12) Depressive symptoms = 10 (7, 12) Anxiety symptoms = 10 (7, 14) Other CMD disorders = 8 (6,9)

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Reis et al. (2011)	BR	Mental and behavioral disorders (ICD-10 F00-F99)	Duration of episode = Number of calendar days absent from work Recurrence density = number of recurrent sickness absences divided by total worker-time at risk for the subsequent sickness absences	Number of sickness absence episodes: Due to any disorder = 5,138 Due to mental and behavioural disorders = 324	Recurrence density/100 worker-months: Due to any disorder = 17.37 Due to mental and behavioural disorders = 6.72
Roelen et al. (2010)	NL	Mental and behavioral disorders from medical certification (ICD-10 F00-F99)	Recurrence density = number of employees with recurrent episodes by the worker-years in the sub-population of men and women with a previous episode of sickness absence	Number of employees with ≥ 1 sickness absence = 36,342 Number of employees with ≥ 1 sickness absence due to mental and behavioural disorders = 7,197 Number of employees with > 1 sickness absence due to mental and behavioural disorders = 1,400 Worker-years = 363,461	From 2001-2007, Recurrence density/1,000 worker-years (95% CI): Mental and behavioural disorders = 80.4 (74.9, 86.0) Any disorder = 81.6 (79.1, 84.0) Median days to recurrence (in days) (95% CI): Mental and behavioural disorders = 328 (284, 372) Any disorder = 384 (367, 401)

Time between Sickness Absence Episodes. Four studies reported the time between episodes related to mental disorders. Koopmans et al.[8] found that the median time was 10 months. In addition, Koopmans et al.[9] observed the median lengths of episode free-months were similar for men (11 months) and women (10 months).

Roelen et al.[10] compared lengths of episode free-days for those related to mental disorders versus those related to any disorder. They found the median length of episode free days was longer for workers who had a previous sickness absence episode for any disorder (384 days) versus those who had a previous episode related to a mental disorder (328 days). Dewa et al.[12] also observed a longer period of sickness absence free days for workers who had a previous sickness absence episode related to a physical disorder (1053 days) than those who had a previous sickness absence episode related to a mental disorder (673 days).

DISCUSSION

This systematic literature review identified 10 studies that ranged from good to excellent quality. The results of the studies could be grouped into two general categories: (1) outcomes focusing on return-to-work and (2) outcomes focusing on sickness absence recurrence. These studies suggest that these are two areas of workplace burden to employers.

Two of the included studies that looked at RTW outcomes indicated that the majority of workers who have a sickness absence return to work at the end of the absence[13 15]. This trend is consistent with early studies that indicated a large proportion of workers return to work at the end of their absence[17 18]. This suggests that retention of workers may not be one of the major burdens associated with sickness absence. It also raises the question of what happens to workers who do not return to work at the end of their sickness absence. This is particularly salient for North American (i.e., United States and Canada) employers who offer long-term work disability benefits to their workforces. Although a small group, workers who receive long-term disability benefits after reaching the limits of their sickness absence benefits could represent high costs. One estimate suggested that it could cost CAN $80,000 per long-term disability claim[5].

The results of the studies suggest that sickness absence duration ranges from 5-119 days. The variation among the estimates may reflect the variation among the sickness benefit schemes of the jurisdictions in which the studies were conducted. However, there were consistencies among a number of reported patterns. For example, the numbers of sickness absence days related to mental disorders were greater than those for physical disorders in the four studies that reported them[6 9 14 15]. In addition, compared to absences related to physical disorders, those related to mental disorders may be of greater length and in turn, burden.

With regard to sickness absence recurrence, the studies that calculated recurrence rates

reported rates that ranged from 7/100 worker months to 80/1,000 worker-years. While there is variation in the magnitudes of the reported rates, two studies also indicated that the time between a sickness absence recurrence is consistently longer for workers who had a past sickness absence related to a physical disorder versus a mental disorder. However, while the pattern seemed to be consistent, the median numbers of sickness absence free days were two to three times greater in Dewa et al.'s[12] study than Roelen et al.'s[10]. Because workers within these respective studies are exposed to the same sickness benefit scheme, the differences within the studies suggest there may be other potential contributors to the differences than solely the sickness benefit scheme. There is an opportunity for future research to explore the role that individual (e.g., the chronic nature of mental disorders), occupational (e.g., job characteristics) and environmental (e.g., workplace stigma) factors play in the differences in the recurrence of physical versus mental disorder related sickness absences.

These results also suggest that although most workers return to work, they also may be at higher risk of a repeat sickness absence episode. While there have been few studies estimating the cost of re-integration, there is evidence suggesting that there may be costs to the workplace related to the process of re-integrating a worker who has been absent because of a sickness episode[19-21]. Moreover, there is evidence to suggest that employers and workers have identified work sustainability without recurrence as an important work outcome[22]. Given that work sustainability without recurrence seems to be a preference of both workers and employees and there are potential costs related to reintegration, these findings suggest that it may be important to consider number of episodes as well as total number of absence days alone. It is also an area that warrants further research to understand the costs associated with the re-integration process.

It should be noted that the sickness absence outcomes that have been studied are related

to the potential direct costs to employers. That is, because of the effect on work productivity, employers will be interested in the length of sickness absences as well as recurrence of sickness absence. However, from a societal perspective, this presents only part of picture. What happens to workers who do not return to work? This is a question governments may want answered especially if it means that those workers become enrolled in the public disability programs[23]. Thus, future work should also examine this group of workers particularly if factors can be identified that retain them in the labour market.

Strengths and Limitations Related to Interpreting the Literature

There were a number of strengths of the current body of literature reviewed. First, all of the data from the included studies used data from complete populations of people who had a sickness absence. This minimizes the potential for selection bias within populations. However, selection bias related to the population chosen is still a possibility. Indeed, there was variation in the populations covered ranging from multiple to single organizations. Consequently, it will be important for future work to examine whether the results are generalizable to different populations.

An additional strength of the included studies was that they used standardized diagnostic classification systems. All included depressive and anxiety disorders as well as stress-related disorders. However, there was variability in the other types of mental disorders considered. This could have affected some of the reported results. At the same time, it should be noted that the majority of sickness absences related to mental disorders are attributable to depression, anxiety and stress-related disorders[24 25]. This suggests that inclusion of these disorders would capture a large proportion of the sickness absences related to mental disorders.

A limitation of the studies was the variation in the years from which the data were taken.

Although all studies used post-2000, there could have been changes within systems that could have affected incidence rates. For example, in the Netherlands, extensive legislative changes occurred between 2000 and 2013 which affected rates[7 26]. In fact, the changes are reflected in the results reported by Roelen et al.[16]. Similarly, changes could have been implemented in other countries such that results may not currently be generalizable.

Another limitation was variability in the sickness absence benefit schemes. That is, the variation in the length of sickness absence episodes in part could be related to the length of sickness absence coverage. The longer the coverage, the longer the absence may be. The frequency of sickness absence recurrence also could be affected by the benefit scheme. If there are limits on the number of sickness absence days that a worker is allowed annually, those workers could have fewer episodes than workers for whom limits do not exist.

Strengths and Limitations of the Search Strategy

Although five databases were used in the search, articles that did not appear in any of the databases could have been overlooked. This possibility was decreased due to the broad scope of each of the searched databases and the hand search. Another limitation is related to the fact that the search focused on articles published in English-language journals. However, despite the English-language constraint, the identified studies originated in European, North American and Latin American countries. This indicates that although they are not in countries where English is the first language, at least some of these researchers publish in English-language journals.

CONCLUSIONS

This systematic literature review identified only 10 studies published in the last decade. Five of them were from the Netherlands. This suggests that this is an emerging area of research. The results of these studies suggest that we are in the early stages of understanding the aspects of

sickness absences that contribute to their burden and in the process, areas to target to effectively decrease their costs. At the same time, there are patterns in the results that could be useful in developing interventions. The results of these studies suggest that along with the incidence of sickness absence related to mental disorders, the length and recurrence (i.e., frequency of recurrence and time between recurrence) of these sickness absences should be areas of concern. Thus, it may be important to evaluate interventions with respect to these two aspects of sickness absences.

DATA SHARING STATEMENT

All the published papers used in this manuscript are publicly available. There are no data available.

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COMPETING INTERESTS

The authors declare that they have no competing interests.

CONTRIBUTORSHIP STATEMENT

CSD led the conception, design, data acquisition, analysis and interpretation of the data; she also led the writing of the overall manuscript. DL collaborated on the design, data acquisition and analysis; he contributed to the writing of the overall manuscript and led the writing of the Methods section. SB collaborated on the design and data acquisition and contributed to the writing of the manuscript. All authors are guarantors of the final manuscript.

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Search Strategy

Database: Medline Current

Search Terms: [exp Mental Disorders/ OR exp Mentally Ill Persons/ OR (mental adj3 disorder$).mp. OR (mental$ adj3 ill$).mp. OR (psychiatric$ adj3 disorder$).mp. OR (psychiatric$ adj3 ill$).mp. OR exp Substance-Related Disorders/ OR exp "Diagnosis, Dual (Psychiatry)"/ OR (concurrent$ adj3 disorder$).mp. OR (dual$ adj3 diag$).mp. OR (alcohol$ adj3 abus$).mp. OR (alcohol$ adj3 depend$).mp. OR (substance$ adj3 abus$).mp. OR (substance$ adj3 depend$).mp. OR (drug$ adj3 abus$).mp. OR (drug$ adj3 depend$).mp. OR addiction$.mp.] **AND** [exp Absenteeism/ OR exp Sick Leave/ OR exp Return to Work/ OR exp Personnel Turnover/ OR Social Welfare/ OR Public Assistance/ OR exp Insurance Disability/ OR exp Insurance Benefits/ OR exp Salaries/ OR exp Fringe Benefits/ OR exp Social Security/ OR exp Retirement/ OR (sick$ adj3 day$).mp. OR (illness$ adj3 leave$).mp. OR (disabilit$ adj3 leave$).mp. OR (short term disabilit$).mp. OR (long term disabilit$).mp. OR (work$ adj3 absence$).mp. OR (return$ to work$).mp. OR (work$ adj3 turnover$).mp. OR (employ$ adj3 turnover$).mp. OR (disabilit$ benefit$).mp. OR (employ$ benefit$).mp. OR (work$ benefit$).mp. OR (sick$ benefit$).mp. OR (incapacit$ benefit$).mp. OR (social$ welfar$).mp. OR (public$ assistanc$).mp. OR (insurance$ disabilit$).mp. OR (insurance$ benefit$).mp. OR (old$ age$ assistanc$).mp. OR (social$ securit$).mp. OR retire$.mp.] **AND** [sn.fs. OR ep.fs. OR preval$.mp. OR incid$.mp. OR statistic$.mp. OR exp Epidemiologic Methods/]

Database: Medline In-process

Search Terms: [exp Mental Disorders/ OR exp Mentally Ill Persons/ OR (mental adj3 disorder$).mp. OR (mental$ adj3 ill$).mp. OR (psychiatric$ adj3 disorder$).mp. OR (psychiatric$ adj3 ill$).mp. OR exp Substance-Related Disorders/ OR exp "Diagnosis, Dual (Psychiatry)"/ OR (concurrent$ adj3 disorder$).mp. OR (dual$ adj3 diag$).mp. OR (alcohol$ adj3 abus$).mp. OR (alcohol$ adj3 depend$).mp. OR (substance$ adj3 abus$).mp. OR (substance$ adj3 depend$).mp. OR (drug$ adj3 abus$).mp. OR (drug$ adj3 depend$).mp. OR addiction$.mp.] **AND** [exp Absenteeism/ OR exp Sick Leave/ OR exp Return to Work/ OR exp Personnel Turnover/ OR Social Welfare/ OR Public Assistance/ OR exp Insurance Disability/ OR exp Insurance Benefits/ OR exp Salaries/ OR exp Fringe Benefits/ OR exp Social Security/ OR exp Retirement/ OR (sick$ adj3 day$).mp. OR (illness$ adj3 leave$).mp. OR (disabilit$ adj3 leave$).mp. OR (short term disabilit$).mp. OR (long term disabilit$).mp. OR (work$ adj3 absence$).mp. OR (return$ to work$).mp. OR (work$ adj3 turnover$).mp. OR (employ$ adj3 turnover$).mp. OR (disabilit$ benefit$).mp. OR (employ$ benefit$).mp. OR (work$ benefit$).mp. OR (sick$ benefit$).mp. OR (incapacit$ benefit$).mp. OR (social$ welfar$).mp. OR (public$ assistanc$).mp. OR (insurance$ disabilit$).mp. OR (insurance$ benefit$).mp. OR (old$ age$ assistanc$).mp. OR (social$ securit$).mp. OR retire$.mp.] **AND** [sn.fs. OR ep.fs. OR preval$.mp. OR incid$.mp. OR statistic$.mp. OR exp Epidemiologic Methods/]

Database: PsycINFO

Search Terms: [exp Mental Disorders/ OR exp Psychiatric patients/ OR (mental adj3 disorder$).mp. OR (mental$ adj3 ill$).mp. OR (psychiatric$ adj3 disorder$).mp. OR (psychiatric$ adj3 ill$).mp. OR exp Drug Abuse/ OR exp Drug Addiction/ OR exp Drug Dependency/ OR exp Alcohol Abuse/ OR exp Addiction/ OR exp Dual Diagnosis/ OR (concurrent$ adj3 disorder$).mp. OR (dual$ adj3 diag$).mp. OR (alcohol$ adj3 abus$).mp. OR (alcohol$ adj3 depend$).mp. OR 321$.cc.[psychological disorders class code] OR 3233.cc.[Substance abuse & addic class code] OR (substance$ adj3 depend$).mp. OR (drug$ adj3 abus$).mp. OR (drug$ adj3 depend$).mp. OR addiction$.mp.] **AND** [exp Employee Absenteeism/ OR (absenteeism$).mp. OR exp Employee Leave Benefits/ OR exp Reemployment/ OR exp Employee Turnover/ OR (social welfar$).mp. OR exp Insurance/ OR exp Salaries/ OR exp employee benefits/ OR exp Social Security/ OR exp Retirement/ OR (sick$ adj3 day$).mp. OR (illness$ adj3 leave$).mp. OR (disabilit$ adj3 leave$).mp. OR (short term disabilit$).mp. OR (long term disabilit$).mp. OR (work$ adj3 absence$).mp. OR (return$ to work$).mp. OR (work$ adj3 turnover$).mp. OR (employ$ adj3 turnover$).mp. OR (disabilit$ benefit$).mp. OR (employ$ benefit$).mp. OR (work$ benefit$).mp. OR (sick$ benefit$).mp. OR (incapacit$ benefit$).mp. OR (social$ welfar$).mp. OR (public$ assistanc$).mp. OR (insurance$ disabilit$).mp. OR (insurance$ benefit$).mp. OR (old$ age$ assistanc$).mp. OR (social$ securit$).mp. OR retire$.mp.] **AND** [preval$.mp. OR incid$.mp. OR statistic$.mp. OR exp Epidemiology/ OR ext Data collection/ OR epidemiolog$.mp. OR (data collection$).mp. OR survey$.mp. OR questionnair$.mp.]

Database: Econlit

Search Terms: [mental disorder* OR mental disorder* OR mental ill* OR psychiatric* OR concurrent* disorder* OR dual* diag* OR alcohol* OR substance* abus* OR substance* depend* OR drug* abus* OR drug* depend* OR addic*] **AND** [absent* OR sick* OR ill* OR disabilit* leav* OR short term disabilit* OR long term disabilit* OR work* OR absence* OR return* to work* OR work* turnover* OR employ* OR benefit* OR welfar* OR public* assistanc* OR insurance* OR old* age* assistanc* OR social securit* OR retire*]

Database: Web of Science

Search Terms: [mental disorder* OR mental ill* OR psychiatric* disorder* OR psychiatric* ill* OR concurrent* disorder* OR dual* diag* OR alcohol* abus* OR alcohol* depend* OR substance* abus* OR substance* depend* OR drug* abus* OR drug* depend* OR addiction*] **AND** [absenteeism* OR sick* day* OR illness* leave* OR disabilit* leav* OR short term disabilit* OR long term disabilit* OR work* absence* OR return* to work* OR work* turnover* OR employ* turnover* OR disabilit* benefit* OR employ* benefit* OR work* benefit* OR sick* benefit* OR incapacit* benefit* OR social* welfar* OR public* assistanc* OR insurance* disabilit* OR insurance* benefit* OR old* age* assistanc* OR social securit* OR retire*] **AND** [preval* OR incid* OR statistic* OR epidemiolog* OR data collection* OR survey* OR questionnair*]

Quality Assessment Checklist

Author(s)	Year	1	2	3	4	5	6	7	8	9	10	Total
Barbosa-Branco et al	2012	1	1	0	1	1	1	0	1	0	1	7
Board & Brown	2011	1	1	0	1	1	1	1	1	0	1	8
Dewa et al	2010	1	1	0	1	1	1	1	1	1	1	9
Dewa et al	2011	1	1	0	1	1	1	1	1	1	1	9
Koopmans et al	2008	1	1	0	1	0	0	0	1	1	1	6
Koopmans et al	2010	1	1	0	1	1	1	0	1	1	1	8
Koopmans et al	2011	1	1	0	1	1	1	1	1	1	1	9
Reis et al	2011	1	1	0	1	1	0	0	1	0	1	6
Roelen et al	2009	1	1	0	1	1	1	1	1	1	1	9
Roelen et al	2010	1	1	0	1	1	1	1	1	1	1	9
Total		10	10	0	10	9	8	6	10	7	10	

Quality Assessment Criteria

1. The study population is well described
2. The data source is well described
3. The study sample is representative of all workers in the context
4. Mental disorders are included and reported
5. The system of diagnosis/classification is described
6. The sickness absence criteria are reported (i.e., pre-sickness absence days to qualify for sickness absence)
7. Sickness absence outcome measures are defined
8. Analytical methods are described
9. Uncertainty of estimates are reported
10. The stated research objective is met

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4-5
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	N/A
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	6-7
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	5-6
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Supplemental File 1
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	6-7
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	N/A
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	6-7
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	7-8
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N/A
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	N/A

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	7-8
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	8, Figure 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	9-10, Table 1
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Supplemental File 2
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	12-18, Table 2-3
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	19-21
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	21-22
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	22-23
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	23

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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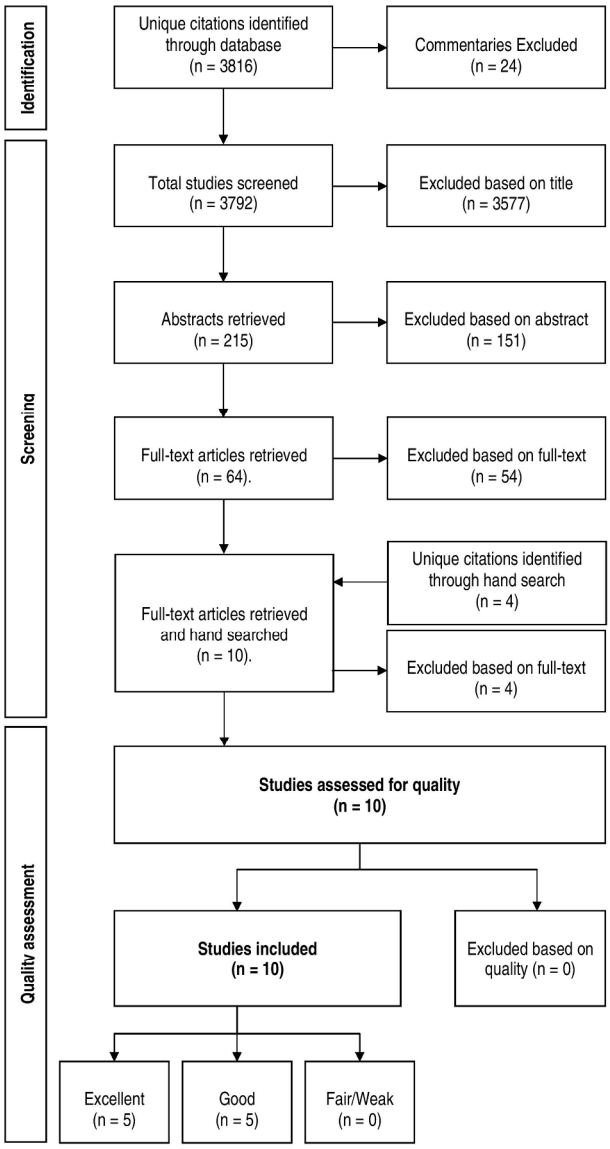

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BMJ Open

Work Outcomes of Sickness Absence Related to Mental Disorders: A Systematic Literature Review

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Keywords:	MENTAL HEALTH, OCCUPATIONAL & INDUSTRIAL MEDICINE, Health economics < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

Work Outcomes of Sickness Absence Related to Mental Disorders: A Systematic Literature Review

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Keywords: mental disorders, work disability, return to work, sickness absence

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Number of tables: 3

Number of references: 32

Number of supplementary files: 2

Work Outcomes of Sickness Absence Related to Mental Disorders: A Systematic Literature Review

Abstract

Objectives The purpose of this systematic literature review is to examine the current state of knowledge regarding the return-to-work outcomes of sickness absences related to mental disorders that increase costs borne by employers. We address two questions: (1) Based on the existing literature, from the employer's perspective, what are the relevant economic return-to-work outcomes for sickness absences related to mental disorders? and (2) From the employer's economic perspective, are there gaps in knowledge about the relevant return-to-work outcomes for sickness absences related to mental disorders?

Setting The included studies used administrative data from either an employer, insurer or occupational healthcare provider.

Participants Studies included working adults between 18-65 years old who had a sickness absence related to a mental disorder.

Primary and secondary outcome measures The studies considered two general return-to-work outcome categories: (1) outcomes focusing on return-to-work and (2) outcomes focusing on sickness absence recurrence.

Results A total of 3,820 unique citations were identified. Of these, 10 studies were identified whose quality ranged from good to excellent. Half of the identified studies came from one country. The studies considered two characteristics of sickness absence: (1) whether and how long it took for a worker to return-to-work and (2) sickness absence recurrence. None of the studies examined return-to-work outcomes related to work reintegration.

Conclusions The existing literature suggests that along with the incidence of sickness absence related to mental disorders, the length of sickness absence episodes and sickness absence recurrence (i.e., number and time between) should be areas of concern. However, there also seems to be gaps in the literature regarding the work reintegration process and its associated costs.

ARTICLE SUMMARY

STRENGTHS AND LIMITATIONS OF THIS STUDY:

- Few studies have examined the current state of knowledge about sickness absence outcomes from the employer perspective; this paper examines the current state of knowledge regarding the return-to-work outcomes of sickness absences related to mental disorders that increase workplace burdens from the perspective of the employer.

- This systematic literature review employed a broad search of five electronic databases: (1) *Medline Current*, (2) *Medline In-process*, (3) *PsycINFO*, (4) *Econlit* and (5) *Web of Science*. A hand search was also conducted. In total, 3,820 unique citations were identified and reviewed by two reviewers.

- All included studies were based on data from complete populations of people who had a sickness absence; this minimizes the potential for selection bias within populations.

- The results of this review suggest that along with the incidence of sickness absence related to mental disorders, the length and sickness absence recurrence (i.e., frequency of sickness absence recurrence and time between sickness absence episodes) of these sickness absences should be areas of concern and future research. This highlights the importance of evaluating interventions with respect to these two aspects of sickness absences rather than focusing solely on whether or not a worker returns to work.

- The results of the search identified 10 papers that met inclusion criteria; this suggests that we are in the early stages of understanding the aspects of sickness absences that contribute to their burden and the areas to target to effectively decrease their costs.

Around the world, there is increasing awareness about the economic costs of mental disorders. Estimates suggest that a large share of the burden of mental disorders can be attributed to work productivity losses. Between 30% and 60% of depression's cost is related to losses associated with decreased work productivity.[1 2] Decreased work productivity has been measured as work absences or an unproductive work day.

Because they take a societal perspective, most of the economic burden estimates for mental disorders rely on survey data (e.g., [1 3 4]). One of the most identifiable types of work absences is related to sickness absences. Yet, few estimates specifically have taken sickness absences into account. Sickness absences are defined as work absences that require a medical certification and have an associated income replacement benefit. The costs of these specific types of absences are not only borne by society but employers in particular. Furthermore, because they involve the workplace, employers often assume the costs and responsibilities for implementing the interventions to address sickness absences. Thus, to effectively build the business case for employers to invest in interventions that target sickness absences related to mental disorders, it is important to identify the costs that employers recognize and directly bear. By using a comprehensive estimate of costs in economic evaluations and economic models we could more accurately estimate the types of cost-savings that employers can expect with an intervention.

The concern among employers regarding mental disorders has been fueled by the recognition that sickness absence episodes related to a mental disorder are costly and their incidence is steadily rising.[5] Estimates suggest that an episode related to a mental disorder can be double the cost of one related to a physical disorder.[6] The calculation of the cost of sickness absences related to mental disorders is comprised of two types of factors: (1) the number of days

absent and (2) the total number of sickness absences. It can be expected that the more sickness absence days, the greater the total cost of the sickness absence. In addition, high costs could be incurred with short sickness episodes if there are many repeat sickness episodes.

One approach to addressing the costs of sickness absence related to mental disorders could be to decrease the impact of both the number of episodes and their lengths. This suggests that interest should extend beyond merely whether or not a worker returns-to-work. Rather, it is also important to understand the length and the frequency of sickness absence related to mental disorders. Few studies have examined the current state of knowledge about sickness absence outcomes from the employer perspective. To fill this gap, we conducted a systematic literature review to examine the sickness absence outcomes reported in the literature. These outcomes could help to identify the aspects of sickness absences that contribute to employer economic burdens.

Purpose of the Paper

The purpose of this paper is to examine the current state of knowledge regarding the return-to-work (RTW) outcomes of sickness absences related to mental disorders that increase workplace burdens from the perspective of the employer. The question that we addressed in this systematic review was, "Based on the existing literature, from the employer's perspective, what are the relevant economic return-to-work outcomes for sickness absences related to mental disorders?" Answers to this question can highlight the aspects of sickness absences related to mental disorders that could escalate the costs that employers face. Results of this review can point to areas that sickness absence interventions could target. They can also suggest dimensions along which future intervention effectiveness could be evaluated.

A secondary question we asked was, "From the employer's economic perspective, are

there gaps in knowledge about the relevant return-to-work outcomes for sickness absences related to mental disorders?" In answering this question, this review takes a first step in understanding where the knowledge in this area is and is not being produced. It also suggests areas where additional study is needed to more accurately estimate the costs of sickness absences borne by employers.

METHODS

This systematic literature review used publically available peer-reviewed studies. It neither involved the collection of nor the use of primary data. As such, it was not subject to research ethics board review.

Five electronic databases were searched for this systematic literature review: (1) *Medline Current* (an index of biomedical research and clinical sciences journal articles), (2) *Medline In-process* (an index of biomedical research and clinical sciences journal articles awaiting indexing into *Medline Current*), (3) *PsycINFO* (an index of journal articles, books, chapters, and dissertations in psychology, social sciences, behavioral sciences, and health sciences), (4) *Econlit* (an index of journal articles, books, working papers and dissertations in Economics) and (5) *Web of Science* (an index of journal articles, editorially selected books and conference proceedings in life sciences and biomedical research). A search strategy was developed and executed for each database with a professional health science librarian (SB) (Supplementary File 1 - Search Strategy). *Medline Current*, *Medline In-process* and *PsychINFO* were searched using the *OVID* platform. *Econlit* and *Web of Science* were searched using the *ProQuest* and *Thomson Reuters* search interface, respectively. The search was completed between February 2013 and March 2013 and was limited to English language journals published between 2002 and 2013.

Eligibility Criteria

The systematic literature search focused on the return-to-work outcomes of sickness

absences of workers with medically certified sickness absences related to mental disorders. Sickness absence encompassed sick leave, short-term disability leave and long-term disability leave. These sickness absence benefits could be either publicly or privately sponsored. Their receipt was conditional on employment and the absence benefit was claimed with the intention of continued employment. We included studies that looked at "no cause" sickness absences such that it was not compulsory that the absence was work-related. The search focused on identifying articles about working adults between 18-65 years old who had a sickness absence related to a mental disorder. Sickness absence outcome terms (i.e., length of sickness absence, return to work, etc.) were not included in the search strategy. This was done to ensure all reported sickness absence outcomes in the literature would be captured. The reference lists of relevant studies were hand searched. Intervention studies, review articles and commentaries were excluded.

A multi-phase screening process was employed. The first phase involved screening titles. Citations that passed the first phase were evaluated for relevance based on their abstracts. Finally, those that passed the abstract screen were evaluated for content based on the full-text. The multi-phase screening process was completed independently by two reviewers, CSD and DL. The chance agreement corrected inter-rater reliability was 0.92. Articles for which there were rater disagreements were discussed until consensus was reached.

The following eligibility criteria were used in each phase:

1. The study reported on medically certified sickness absences due to mental disorders.
2. The study sample is not from a select (i.e., clinical trial) population.
3. The study analyzed data that were collected in the year 2000 or later.
4. The study reported on sickness absence outcomes directly related to a specific absence.

Sickness absence outcomes considered for this review included length of sickness absence, not returning to work (i.e., quitting, retiring), transitioning to long term disability, returning to work, and sickness absence recurrence.

Because the 1990s was a period of global change in disability policies and accounting for publication lag, the year 2002 was used as an inclusion starting point.[7] We focused on the last decade because there were relatively fewer policy changes related to workers during this time. Studies using pre-2000 data were excluded because pre-2000 data were collected within systems that existed before many of the 1990s policy changes.

Quality Assessment

Articles that passed the three-stage screening process were then assessed for quality using the following criteria:

1. The study population is well described.
2. The data source is well described.
3. The study sample is representative of all workers in the context.
4. Mental disorders are included and reported.
5. The system of diagnosis/classification is described.
6. The sickness absence criteria are reported (i.e., pre-sickness absence days to qualify for sickness absence).
7. Sickness absence outcome measures are defined.
8. Analytical methods are described.
9. Uncertainty of estimates are reported.
10. The stated research objective is met.

One point was awarded for each criterion that was met; the maximum score was 10. Total scores between 1 and 4 points were categorized as *fair/weak* quality, those between 5 and 8 points were *good* and those between 9 and 10 points were *excellent* quality.

RESULTS

Description of Inclusion and Exclusion

The electronic literature search resulted in the identification of 3,820 unique citations (Figure 1). From these, 24 entries that were commentaries were excluded. Based on the title review, 3,577 citations were excluded. During the abstract review, another 151 citations were excluded; this left 64 articles for full-text review. After the full-text review, 10 articles remained and their reference lists were hand searched for relevant studies. Four articles were identified in the hand search process but all were excluded during full-text review. Reasons for article exclusions were because they: (1) used pre-2000 data (n = 11), (2) did not report sickness absence outcomes directly related to a specific absence (n = 3), (3) were based on select populations (n = 44).

Insert Figure 1

Quality Assessment

Upon quality assessment, 5 of the 10 studies were rated as *excellent* and the remaining 5 as *good* (Supplementary File 2 - Quality Assessment). The identified limitations of these studies included: non-representativeness of the working population (n = 10), outcome measure not defined (n = 4), and uncertainty of the estimate not reported (n = 3).

Overview of the Studies

Table 1 contains the descriptions of the included studies. All of the included studies used administrative data from either an employer, insurer or occupational healthcare provider. As a result, none of the studies relied on self-report. They were based on objective data to identify populations of people with a sickness absence.

Of the 10 included studies, five were from the Netherlands. Two were from Brazil, two were from Canada and another from the UK. Seven of the studies used data from single employers. The employers in the studies represented a variety of sectors in several countries including a Dutch national postal service and a telecommunication company,[8-10] a Brazilian hospital,[11] a Canadian resource sector organization[6 12] and a British police force.[13] The four exceptions were Barbosa-Branco et al.[14] whose study included all Brazilian workers in registered private sector companies. In addition, Koopman et al.[15] and Roelen et al.[16] based their studies on data from an occupational health provider representing a broad spectrum of firms across the Netherlands.

All of the studies except one indicated that they used the International Classification of Diseases (ICD) to identify type of disorder. Of those that used the ICD, eight of the studies were based on the 10th edition and one on the 8th edition. One study[15] did not describe the disorder classification system it employed. However, because it used ArboNed data that were also used by Roelen et al.,[16] it might be assumed that ICD codes were also used in this study.

Among the studies, there was variability in the scope of the primary diagnoses associated with the sickness absences that were included. However, there were similarities with respect to the inclusion of depressive and anxiety disorders and stress-related disorders. Thus, there appeared to be consistency among the studies with regard to a core set of mental disorders.

There was variation with regard to the number of absence days needed to qualify for sickness absence benefits. The number of days ranged from one to three weeks.

Table 1. Overview of Studies

Author(s)	Country	Study Population	Data Source(s)	Years of Data	Diagnostic Classification System Used	Sickness Absence Benefit Definition	Outcomes
Barbosa-Branco et al. (2012)	BR	All employees in registered private sector jobs in 2008 who a sickness absence	Brazilian National Social Security Administrative Databases: National Benefits System and National Social Information Database	2008	International Classification of Diseases,10th edition (ICD-10)	Sickness absence = ≥ 15 medically certified consecutive days absent	Duration of sickness benefit claim (calendar vs work days not specified)
Board & Brown (2011)	UK	Study sample consisted of all employees of one police force who had ≥ 1 episode of long-term sickness absence (LTSA) between Nov 1, 2000 and Oct 31, 2002	Employer electronic absenteeism record administrative data	2000-2002	International Classification of Diseases,8th edition (ICD-8)	Long-term sickness absence = medically certified sickness absence episodes ≥ 28 consecutive calendar days	Return to work by type of sickness absence episode (sub-acute or chronic)
Dewa et al. (2010)	CA	Employees from one large resource sector company from 2003-2006 who had a sickness absence	Employer administrative sickness absence data	2003-2006	ICD-10	Sickness absence = medically certified sickness absence of ≥ 5 continuous work days	Mean work days per sickness absence episode
Dewa et al. (2011)	CA	Employees from one large resource sector company from 2003-2006 who had a sickness absence	Employer administrative sickness absence data	2003-2006	ICD-10	Sickness absence = medically certified sickness absence of ≥ 5 continuous work days	Sickness absence free days
Koopmans et al. (2008)	NL	Employees of firms who were clients of one occupational health services provider from April 2002 – November 2005 who had a sickness absence.	Administrative sickness absence data from one occupational health service provider (ArboNed)	2002-2005	Not described	Not described	Return to work Duration of absence calendar days
Koopmans et al. (2010)	NL	Dutch Post and Telecommunication employees from 2001-2007 who had a sickness absence due to a common mental disorder since Jan 1, 2001 or date of employment	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sick leaves of > 3 weeks require a medical certificate from an occupational physician	Duration of sickness absence days (calendar vs work days not specified) Days to sickness absence recurrence

Author(s)	Country	Study Population	Data Source(s)	Years of Data	Diagnostic Classification System Used	Sickness Absence Benefit Definition	Outcomes
Koopman et al. (2011)	NL	Dutch Post and Telecommunication employees from 2001-2007 who had a sickness absence due to a common mental disorder	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sick leaves of > 3 weeks require a medical certificate from an occupational physician	Duration of sickness episodes Median duration in months until recurrence of sickness absence Days to sickness absence recurrence Recurrence = the start of at least one new episode of sickness absence after complete return to work for ≥ 28 days
Reis et al. (2011)	BR	Workers who worked ≥ 20 hours/week from one university hospital who were employed from 2000-2007 who had at least 1 sickness absence	Administrative data from employer human resources department	2000-2007	ICD-10	Not described	Median calendar days per sickness absence Recurrence density of sickness absence episodes/100 worker-months
Roelen et al. (2009)	NL	Employees of firms who were clients of an occupational health services provider from 2001-2007 who had a sickness absence	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sickness absence: absence of ≥ 28 sick days requiring a medical certificate from an occupational physician	Median number of calendar days of sickness absence episodes/100 employees
Roelen et al. (2010)	NL	Dutch Post and Telecommunication employees from 2001-2007 who had a sickness absence	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sick leaves of > 3 weeks require a medical certificate from an occupational physician.	Median duration of sickness absence in days (type of day not specified) Recurrence density of sickness absence/1,000 worker-years Days to recurrence

Sickness Absence Outcomes

The outcomes reported by the studies could be grouped into two general categories. The

first outcome category includes studies that examined whether and when a worker returned to work. They included RTW indicators and sickness absence duration. The second category of outcomes focused on sickness absence recurrence. These recurrence outcomes reflected the rates of sickness absence recurrence as well as the time between sickness absence episodes.

Outcomes focusing on Return-to-Work. Three studies reported the rates of RTW (Table 2). Koopmans et al.[15] observed that of workers who had sickness absences due to depression, 66% returned to work within a year. Board and Brown[13] found that among their police force, 85% of police officers who had a sickness absence returned to work.

Duration of sickness absence. Duration of sickness absence was measured using three types of days – calendar days, work days and unspecified types of days. Sickness absence days were reported using two statistics – the mean days and the median days. The values of the mean and the median become equivalent when a distribution is symmetric (e.g., the normal distribution). From the Netherland studies, the median days of absence duration were between 79 and 119 days.[8-10 15 16] In addition, there were changes in the median number of days over time such that they seemed to decrease between 2001 and 2007.[16] From Brazil, Reis et al.[11] reported a duration of 5-7 calendar days. Using Canadian data, Dewa et al.[6] reported a mean absence episode of 65 work days. From the UK, Board and Brown[13] found that 43-60% of the workers they observed had a sickness absence episode that was between 28-90 days; about 41-57% had sickness absence episodes that lasted more than 90 days.

Table 2. Return-to-Work Sickness Absence Outcomes

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Barbosa-Branco et al. (2012)	BR	Mental and behavioural disorders: Organic disorders (ICD-10 F00-F09); psychoaffective substance use disorders (ICD-10 F10-F19); schizophrenia, schizotypal and delusional disorders (ICD-10 F20-F29); mood disorders (ICD-10 F30-F39); stress-related and somatoform disorders (ICD-10 F40-F48)	Duration of sickness benefit claim = measure not described	Number of claims due to mental and behavioural disorders: All = 147,105 Males = 71,195 Females = 75,910	Median duration of disability episodes (in days) (1st and 3rd quartiles): Males: Mental and behavioural disorders = 76 (47, 113) Females: Mental and behavioural disorders = 65 (43, 97)
Board and Brown (2011)	UK	ICD categories used not described	Absence phase: Sub-acute = 28-90 days Chronic phase = > 90 days Return-to-Work = episode has start and finish dates before study end date	Number of sickness absences: Police officers = 4,485 Civilian staff = 1,761	Among those with mental ill health: Police officers: With sub-acute episode = 43.2% With chronic episode = 56.8% Who return to work = 85.2% Civilian staff: With sub-acute episode = 59.5% With chronic episode = 40.5% Who return to work = Not reported
Dewa et al. (2010)	CA (Ontario)	Mental and behavioural disorders (ICD-10 F00-F99, Z502, Z503, Z561-Z566, Z630-Z639, Z729, Z733, Z738, Z864, Z915): schizophrenia, mood disorders, stress-related disorders and mental and behavioral disorders due to psychoactive substance use	Duration of episode = number of work days absent	Number of sickness absences: Due to any disorder = 4,791 Due to mental and behavioural disorders = 698	Mean days per episode (in days) (95% Confidence Interval): Due to any disorder = 33.0 (31.3, 34.7) Due to mental and behavioural disorders: All = 64.9 (58.2, 71.6) Males = 62.1 (54.1, 70.1) Females = 70.0 (57.8, 82.1)
Koopmans et al. (2008)	NL	Depression (Diagnostic classification system not descripted in paper)	Duration of episode = number of calendar days between first day of sick leave and date of return to work or disability pension received	Number of new episodes due to depression = 9,910	Return to work within a year: Men = 67.7% Women = 64.8% Total = 66.2% One year of work incapacity: Men = 15.2% Women = 17.4% Total = 16.4% Mean duration of episode (in days) (95% CI): Men = 200 (196, 204) Women = 213 (210, 217) Median duration of episode (in days) (95% CI): Men = 179 (172, 186) Women = 201 (193, 209)

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Koopmans et al. (2010)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32.0, F32.1, F40.0, F40.1, F40.2, F41.0, F41.1, F41.2, F41.3)	Duration of sickness absence = number of calendar days between first day of sick leave and date of return to work or disability pension received	Number of employees with ≥ 1 sickness absence due to CMD = 8,951 Total number of sickness absence due to CMD = 10,921	From 2001-2007, median duration of index sickness absence episode (in days) (95% CI): Men: Stress = 49 (47, 51) Psychiatric = 168 (150, 186) Total CMD = 57 (54, 60) Women: Stress = 56 (53, 59) Psychiatric = 168 (151, 185) Total CMD = 67 (63, 71) From 2001-2007, median duration of recurrent CMD sickness absence episodes (in days) (95% CI): Men: Stress = 46 (41, 51) Psychiatric = 68 (39, 97) Total CMD = 48 (43, 53) Women: Stress = 60 (51, 69) Psychiatric = 73 (53, 93) Total CMD = 62 (55, 69)
Koopmans et al. (2011)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32, F40, F41)	Duration of sickness absence = number of calendar days of sickness absence adjusted for partial return to work and annual worker- years	Number of employees with ≥ 1 sickness absence due to CMD = 9,904 Total number of sickness absences due to CMD = 12,404	From 2001-07, duration of sickness absence episode due to CMD (in calendar days) (95% CI): Total = 62 (60, 64) Men = 57 (55, 59) Women = 68 (65, 71)
Reis et al. (2011)	BR	Mental and behavioral disorders (ICD-10 F00-F99)	Duration of episode = Number of calendar days absent from work	Number of sickness absence episodes: Due to any disorder = 5,138 Due to mental and behavioural disorders = 324	Median duration of sickness absence leave (in days): First episode: Due to any disorder = 2 Due to mental and behavioural disorders = 5 Recurrent episodes: Due to any disorder = 2 Due to mental and behavioural disorders = 7

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Roelen et al. (2009)	NL	Mental and behavioral disorders (ICD-10 R45, F43, F32, F40 and F41) from medical certification: emotional disturbance, depressive disorders, anxiety disorders and stress-related disorders	Duration of sickness absence = calendar days between the first and last day of sickness absence	Number of sickness absence episodes: Due to any disorder: 2001 = 90,095 2002 = 104,193 2003 = 118,926 2004 = 129,024 2005 = 128,044 2006 = 108,901 2007 = 96,482 Due to mental and behavioural disorders: 2001 = 21,140 2002 = 22,803 2003 = 24,917 2004 = 27,533 2005 = 22,682 2006 = 20,013 2007 = 18,513	Median duration of sickness absence episodes (in days) (95% CI): Due to any disorder: 2001 = 73 (72, 74) 2002 = 63 (62, 64) 2003 = 57 (56, 58) 2004 = 53 (53, 53) 2005 = 45 (45, 45) 2006 = 49 (48, 50) 2007 = 55 (54, 56) Due to mental and behavioural disorders: 2001 = 119 (116, 122) 2002 = 98 (96, 100) 2003 = 87 (85, 89) 2004 = 80 (79, 81) 2005 = 79 (77, 81) 2006 = 83 (81, 85) 2007 = 87 (85, 89)
Roelen et al. (2010)	NL	Mental and behavioral disorders (ICD-10 F00-F99) from medical certification	Duration of sickness absence = number of days between first day of sick leave and date of return to work or disability pension received	Number of employees with ≥ 1 sickness absence = 36,342 Number of employees with ≥ 1 sickness absence due to mental and behavioural disorders = 7,197 Number of employees with > 1 sickness absence due to mental and behavioural disorders = 1,400 Worker-years = 363,461	Median duration of sickness absence (in days) (95% CI): Mental and behavioural disorders = 62 (55, 69) Any disorder = 35 (34, 36)

Four of the studies compared sickness absence episode duration for those related to mental disorders versus those for other disorders. The findings among the four studies were consistent; episodes for mental disorders were longer than episodes related to other types of disorders. For instance, Roelen et al.[10] reported that while the median duration of a mental disorder related episode was 62 days, it was 35 days for any type of episode. In addition, this

pattern appeared to be consistent from 2001 to 2007.[16] Among their Canadian energy sector workers, Dewa et al.[6] found that the mean number of work days of an episode related to a mental disorder was almost double that of an episode related to other types of disorders (65 days versus 33 days). Reis et al.[11] reported similar patterns among their sample of Brazilian healthcare workers.

Outcomes Focusing on Sickness Absence Recurrence. Three of the studies reported rates of sickness absence recurrence related to a mental disorder (Table 3). Roelen et al.[10] reported recurrence rates of 80/1000 worker-years for mental and behavioural disorders as opposed to 82/1000 worker-years for any disorder. Reis et al.[11] found rates of 7/100 worker-months for mental and behavioural disorders and 17/100 worker-months for any disorder. In addition, Koopmans et al.[9] observed mental disorder sickness absence recurrence rates of 76/1000 worker-years for men and 79/1000 worker-years for women. They also found that 18% of workers with at least one sickness absence episode had a recurrent episode.[9]

Table 3. Recurrence Sickness Absence Outcomes

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Dewa et al. (2011)	CA (Ontario)	Mental and behavioural disorders (ICD-10 F00-F99, Z502, Z503, Z561-Z566, Z630-Z639, Z729, Z733, Z738, Z864, Z915): schizophrenia, mood disorders, stress-related disorders and mental and behavioral disorders due to psychoactive substance use	Disability free days = number of between end of first episode and beginning of subsequent episode	Number of employees with ≥1 sickness absence episode: Due to mental disorders = 422 Due to physical disorders = 3,171	Median disability free days (standard error): Previous episode for mental disorders = 673 (79.8) Previous episode for physical disorders = 1053 (48.6)

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Koopmans et al. (2010)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32.0, F32.1, F40.0, F40.1, F40.2, F41.0, F41.1, F41.2, F41.3)	Recurrence density = number of employees with recurrent episodes by the worker-years in the sub-population of men and women with a previous episode of sickness absence due to a CMD New episodes = > 28 days apart Worker-years = years of coverage from index episode to end of employment period	Number of employees with ≥ 1 sickness absence due to CMD = 8,951 Total number of sickness absence due to CMD = 10,921	From 2001-2007, episodes per worker with ≥ 1 sickness absence related to CMD: 1 episode = 82% 2 episodes = 14% 3 episodes = 3% ≥ 4 episodes = 1% From 2001-07, CMD recurrence densities/1,000 worker-years (95% CI): Men: Stress = 74.4 (72.9, 76.0) Psychiatric = 83.8 (71.9, 95.7) Total CMD = 75.6 (70.7, 80.4) Women: Stress = 78.4 (75.9, 80.9) Psychiatric = 78.9 (64.1, 93.7) Total CMD = 78.5 (72.4, 84.6) From 2001-07, CMD sickness absence median time to onset recurrence (in months) (95% CI): Men: Stress = 11 (11, 13) Psychiatric = 12 (8, 15) Total CMD = 11 (10, 13) Women: Stress = 11 (9, 12) Psychiatric = 10 (8, 12) Total CMD = 10 (9, 12)
Koopmans et al. (2011)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32, F40, F41)	Recurrence density = number of employees with recurrent episodes by the worker-years in the sub-population of men and women with a previous episode of sickness absence due to a CMD Worker-years = years of coverage from index episode to end of employment period	Number of employees with ≥ 1 sickness absence due to CMD = 9,904 Total number of sickness absences due to CMD = 12,404	From 2001-07, CMD sickness absence median time to onset recurrence (in months) (95% CI): Total = 10 (10, 11) Distress symptoms = 11 (10, 12) Adjustment disorder = 11 (9, 12) Depressive symptoms = 10 (7, 12) Anxiety symptoms = 10 (7, 14) Other CMD disorders = 8 (6,9)

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Reis et al. (2011)	BR	Mental and behavioral disorders (ICD-10 F00-F99)	Duration of episode = Number of calendar days absent from work Recurrence density = number of recurrent sickness absences divided by total worker-time at risk for the subsequent sickness absences	Number of sickness absence episodes: Due to any disorder = 5,138 Due to mental and behavioural disorders = 324	Recurrence density/100 worker-months: Due to any disorder = 17.37 Due to mental and behavioural disorders = 6.72
Roelen et al. (2010)	NL	Mental and behavioral disorders from medical certification (ICD-10 F00-F99)	Recurrence density = number of employees with recurrent episodes by the worker-years in the sub-population of men and women with a previous episode of sickness absence	Number of employees with ≥1 sickness absence = 36,342 Number of employees with ≥1 sickness absence due to mental and behavioural disorders = 7,197 Number of employees with > 1 sickness absence due to mental and behavioural disorders = 1,400 Worker-years = 363,461	From 2001-2007, Recurrence density/1,000 worker-years (95% CI): Mental and behavioural disorders = 80.4 (74.9, 86.0) Any disorder = 81.6 (79.1, 84.0) Median days to recurrence (in days) (95% CI): Mental and behavioural disorders = 328 (284, 372) Any disorder = 384 (367, 401)

Time between Sickness Absence Episodes. Four studies reported the time between episodes related to mental disorders. Koopmans et al.[8] found that the median time was 10 months. In addition, Koopmans et al.[9] observed the median lengths of episode free-months were similar for men (11 months) and women (10 months).

Roelen et al.[10] compared lengths of episode free-days for those related to mental disorders versus those related to any disorder. They found the median length of episode free days was longer for workers who had a previous sickness absence episode for any disorder (384 days) versus those who had a previous episode related to a mental disorder (328 days). Dewa et al.[12] also observed a longer period of sickness absence free days for workers who had a previous sickness absence episode related to a physical disorder (1053 days) than those who had a previous sickness absence episode related to a mental disorder (673 days).

DISCUSSION

Based on the existing literature, from the employer's perspective, what are the relevant economic return-to-work outcomes for sickness absences related to mental disorders? The results of the 10 studies could be grouped into two general outcome categories: (1) outcomes focusing on return-to-work and (2) outcomes focusing on sickness absence recurrence.

Two of the included studies that looked at RTW outcomes indicated that the majority of workers who have a sickness absence return to work at the end of the absence.[13 15] This trend is consistent with early studies that indicated a large proportion of workers return to work at the end of their absence.[17 18] This suggests that retention of workers may not be one of the major burdens associated with sickness absence. It also raises the question of what happens to workers who do not return to work at the end of their sickness absence. This is particularly salient for North American (i.e., United States and Canada) employers who offer long-term work disability benefits to their workforces. Although a small group, workers who receive long-term disability benefits after reaching the limits of their sickness absence benefits could represent high costs. One estimate suggested that it could cost CAN $80,000 per long-term disability claim.[5]

The results of the studies suggest that sickness absence duration ranges from 5-119 days. The variation among the estimates may reflect the variation among the sickness benefit schemes of the jurisdictions in which the studies were conducted. However, there were consistencies among a number of reported patterns. For example, the numbers of sickness absence days related to mental disorders were greater than those for physical disorders in the four studies that reported them.[6 9 14 15] In addition, compared to absences related to physical disorders, those related to mental disorders may be of greater length and in turn, burden.

With regard to sickness absence recurrence, the studies that calculated sickness absence

recurrence rates reported rates that ranged from 7/100 worker months to 80/1,000 worker-years. While there is variation in the magnitudes of the reported rates, two studies also indicated that the time between a sickness absence recurrence is consistently longer for workers who had a past sickness absence related to a physical disorder versus a mental disorder. However, while the pattern seemed to be consistent, the median numbers of sickness absence free days were two to three times greater in Dewa et al.'s[12] study than Roelen et al.'s.[10] Because workers within the respective studies are exposed to the same sickness benefit scheme, the differences within the studies suggest there may be other potential contributors to the differences than solely the sickness benefit scheme. There is an opportunity for future research to explore the role that individual (e.g., the chronic nature of mental disorders), occupational (e.g., job characteristics) and environmental (e.g., workplace stigma) factors play in the differences in the recurrence of physical versus mental disorder related sickness absences.

These results also suggest that although most workers return to work, they also may be at risk of a repeat sickness absence episode. Indeed, the literature suggests that mental disorders such as depression are chronic in nature and have a high recurrence rate.[19-21] However, does symptom relapse automatically necessitate an accompanying sickness absence? Given that work disability is not solely a medical problem, there have been suggestions that the prognosis need not be fatalistic; sickness absence is not always required. For example, workplace accommodations could help workers experiencing an episode of mental illness continue to work during an episode.[22 23] In addition, there is an emerging literature looking at the effectiveness of interventions in decreasing sickness absence recurrence for mental disorders.[24 25] That is, although there have been arguments for treating mental disorders as chronic illnesses, there have been few intervention studies that have focused on decreasing sickness absence recurrence for

mental disorders.

This also points to one of the gaps in the literature. Few studies have estimated the components of the cost of work reintegration and accommodation for workers with mental disorders. None of the studies identified in this review examined the time it took for a worker to completely reintegrate back into work. For example, how long is the work accommodation period? Furthermore, how is productivity affected during the reintegration period? There is evidence suggesting that there may be costs to the employer related to the process of reintegrating a worker who has been absent because of a sickness episode.[22 26 27] There also is evidence to suggest that employers and workers have identified work sustainability without sickness absence recurrence as an important work outcome.[28] Given that work sustainability without sickness absence recurrence seems to be a preference of both workers and employees and there are potential costs related to reintegration and accommodation, it may be important to consider the number of episodes (i.e., recurrence rates) as well as total number of absence days alone. Few burden of illness studies for mental disorders have included the costs of recurrent sickness absence in their estimates. But, recurrent sickness absence episodes seem to be a cost that warrants consideration for inclusion in cost estimates as well as for intervention outcomes.

In addition, five of the 10 studies identified are from one country (the Netherlands) and two population groups within that country. At the same time, the databases that were used represented between 10,000 and 100,000 claims. Thus, the findings that emerge from these databases build a compelling case that the length of sickness absence and its recurrence is a burden on employers. However, the fact that the majority of the evidence is being generated by one country raises interesting questions. Is the reason that the Netherlands and Northern Europe are the sources of most of the intervention studies for sickness absences related to mental

disorders because they have compelling data to make the case about the costs to employers? Are the results from the Netherlands generalizable to other countries?

In addition to the Dutch studies, there were five other studies identified. However, these studies actually represented a total of four population groups. Three of the datasets each represented about 5,000 claims from single organizations (the studies from the UK, Canada and one Brazilian study). The exception was the one Brazilian study that represented 140,000 claims (all workers in registered private sector jobs). This suggests that there is an opportunity for the evidence base to grow in these countries. It also begs the question, "What is known about the sickness absence burden in other countries that were not represented in this search (i.e., the US, the missing EU countries and Asia)?" Does the absence of studies from other countries indicate that it is not a concern in the other countries? Or, is it an indication that awareness is yet to be raised?

Strengths and Limitations Related to Interpreting the Literature

There were a number of strengths of the current body of literature reviewed. First, all of the data from the included studies used data from complete populations of people who had a sickness absence. This minimizes the potential for selection bias within populations. However, selection bias related to the population chosen is still a possibility. Indeed, there was variation in the populations covered ranging from multiple to single organizations. Consequently, it will be important for future work to examine whether the results are generalizable to different populations.

An additional strength of the included studies was that they used standardized diagnostic classification systems. All included depressive and anxiety disorders as well as stress-related disorders. However, there was variability in the other types of mental disorders considered. This

could have affected some of the reported results. At the same time, it should be noted that the majority of sickness absences related to mental disorders are attributable to depression, anxiety and stress-related disorders.[29 30] This suggests that inclusion of these disorders would capture a large proportion of the sickness absences related to mental disorders.

A limitation of the studies was the variation in the years from which the data were taken. Although all studies used post-2000, there could have been changes within systems that could have affected incidence rates. For example, in the Netherlands, extensive legislative changes occurred between 2000 and 2013 which affected rates.[7 31] In fact, the changes are reflected in the results reported by Roelen et al.[16] Similarly, changes could have been implemented in other countries such that results may not currently be generalizable.

Another limitation was variability in the sickness absence benefit schemes. That is, the variation in the length of sickness absence episodes in part could be related to the length of sickness absence coverage. The longer the coverage, the longer the absence may be. The frequency of sickness absence recurrence also could be affected by the benefit scheme. If there are limits on the number of sickness absence days that a worker is allowed annually, those workers could have fewer episodes than workers for whom limits do not exist.

Strengths and Limitations of the Search Strategy

Although five databases were used in the search, articles that did not appear in any of the databases could have been overlooked. This possibility was decreased due to the broad scope of each of the searched databases and the hand search. Another limitation is related to the fact that the search focused on articles published in English-language journals. However, despite the English-language constraint, the identified studies originated in European, North American and Latin American countries. This indicates that although they are not in countries where English is

the first language, at least some of these researchers publish in English-language journals.

It should be noted that the sickness absence outcomes that have been studied are related to the potential direct costs to employers. That is, because of the effect on work productivity, employers will be interested in the length of sickness absences as well as recurrence of sickness absence. However, from a societal perspective, this presents only part of picture. What happens to workers who do not return to work? This is a question governments may want answered especially if it means that those workers become enrolled in the public disability programs.[32] Thus, future work should also examine this group of workers particularly if factors can be identified that retain them in the labour market.

CONCLUSIONS

This systematic literature review identified only 10 studies published in the last decade. The results of these existing studies suggest that along with the incidence of sickness absence related to mental disorders, the length and recurrence (i.e., frequency of recurrence and time between recurrence) of these sickness absences should be areas of concern.

This systematic review also highlights gaps in the literature. For instance, half of the existing studies are from the Netherlands. That is, most of the literature in this area is based on the Netherland's experience. This suggests that in other parts of the world, this area of research is in its infancy. It will be important for research in other countries to look at the length and sickness absence recurrence (i.e., frequency of recurrence and time between recurrences) of sickness absences. This basic knowledge will help with understanding to what extent it should be a concern for employers in other countries. In turn, it could also help to build the business case for increased resources toward the development of more sickness absence interventions in these other countries.

The results of this review also indicate that we are in the early stages of understanding the aspects of sickness absences that contribute to employer burden and along the same vein, areas to target to effectively decrease costs. For example, more research is needed regarding the costs of recurrence including the cost of reintegration and time to full reintegration. This suggests that current cost estimates may underestimate the costs of sickness absences from the employer's perspective. To effectively build the business case for employers to invest in interventions that target sickness absences related to mental disorders, it will be important to develop a more comprehensive picture of the costs associated with sickness absence that employers directly bear. Only in this way can economic evaluations and economic models accurately estimate the types of cost-savings that employers can expect with an intervention.

DATA SHARING STATEMENT

No additional data available

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COMPETING INTERESTS

The authors declare that they have no competing interests.

CONTRIBUTORSHIP STATEMENT

CSD led the conception, design, data acquisition, analysis and interpretation of the data; she also led the writing of the overall manuscript. DL collaborated on the design, data acquisition and analysis; he contributed to the writing of the overall manuscript and led the writing of the Methods section. SB collaborated on the design and data acquisition and contributed to the writing of the manuscript. All authors are guarantors of the final manuscript.

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Work Outcomes of Sickness Absence Related to Mental Disorders: A Systematic Literature Review

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Work Outcomes of Sickness Absence Related to Mental Disorders: A Systematic Literature Review

Abstract

Objectives The purpose of this systematic literature review is to examine the current state of knowledge regarding the return-to-work outcomes of sickness absences related to mental disorders that increase costs borne by employers. We address two questions: (1) Based on the existing literature, from the employer's perspective, what are the relevant economic return-to-work outcomes for sickness absences related to mental disorders? and (2) From the employer's economic perspective, are there gaps in knowledge about the relevant return-to-work outcomes for sickness absences related to mental disorders?

Setting The included studies used administrative data from either an employer, insurer or occupational healthcare provider.

Participants Studies included working adults between 18-65 years old who had a sickness absence related to a mental disorder.

Primary and secondary outcome measures The studies considered two general return-to-work outcome categories: (1) outcomes focusing on return-to-work and (2) outcomes focusing on sickness absence recurrence.

Results A total of 3,820 unique citations were identified. Of these, 10 studies were identified whose quality ranged from good to excellent. Half of the identified studies came from one country. The studies considered two characteristics of sickness absence: (1) whether and how long it took for a worker to return-to-work and (2) sickness absence recurrence. None of the studies examined return-to-work outcomes related to work reintegration.

Conclusions The existing literature suggests that along with the incidence of sickness absence related to mental disorders, the length of sickness absence episodes and sickness absence recurrence (i.e., number and time between) should be areas of concern. However, there also seems to be gaps in the literature regarding the work reintegration process and its associated costs.

~~**Background.** Sickness absence is one of the most identifiable and costly types of losses related to mental disorders. Few cost of illness estimates specifically have taken sickness absences into account. To build the case for employers to invest in interventions that target sickness absences, it is important to identify the costs associated with them. The purpose of systematic literature review is to examine the current state of knowledge regarding the characteristics of sickness absences related to mental disorders that increase workplace burdens from the perspective of the employer.~~

Methods. A systematic literature search was performed using: *Medline Current*, *Medline In-process*, *PsycINFO*, *Econlit* and *Web of Science*. The search period covered 2002-2013. The systematic literature search focused on the sickness absence outcomes of workers with medically certified sickness absences related to mental disorders.

Results. A total of 3,820 unique citations were identified. Of these, 10 studies were identified whose quality ranged from good to excellent. The studies considered two characteristics of sickness absence: (1) whether and how long it took for a worker to return-to-work and (2) sickness absence recurrence. These studies suggest that these are two areas of workplace burden to employers.

Conclusions. The existing literature suggests that along with the incidence of sickness absence related to mental disorders, the length and recurrence (i.e., number and time between) of these sickness absences should be areas of concern. Thus, it may be important to evaluate interventions with respect to these two aspects of sickness absences.

ARTICLE SUMMARY

STRENGTHS AND LIMITATIONS OF THIS STUDY:

- Few studies have examined the current state of knowledge about sickness absence outcomes from the employer perspective; this paper examines the current state of knowledge regarding the ~~characteristics~~ return-to-work outcomes of sickness absences related to mental disorders that increase workplace burdens from the perspective of the employer.
- This systematic literature review employed a broad search of five electronic databases: (1) *Medline Current*, (2) *Medline In-process*, (3) *PsycINFO*, (4) *Econlit* and (5) *Web of Science*. A hand search was also conducted. In total, 3,820 unique citations were identified and reviewed by two reviewers.
- All included studies were based on data from complete populations of people who had a sickness absence; this minimizes the potential for selection bias within populations.
- The results of this review suggest that along with the incidence of sickness absence related to mental disorders, the length and sickness absence recurrence (i.e., frequency of sickness absence recurrence and time between sickness absence ~~recurrence~~ episodes) of these sickness absences should be areas of concern and future research. This highlights the importance of evaluating interventions with respect to these two aspects of sickness absences rather than focusing solely on whether a worker returns to work.
- The results of the search identified 10 papers that met inclusion criteria; this suggests that we are in the early stages of understanding the aspects of sickness absences that contribute to their burden and the areas to target to effectively decrease their costs.

Around the world, there is ~~anxiety~~ increasing awareness about the economic costs of mental disorders. Estimates suggest that a large share of the burden of mental disorders can be attributed to ~~losses in~~ work productivity losses. Between 30% and 60% of depression's cost is related to losses associated with decreased work productivity[1 2]. Decreased work productivity has been measured as work absences or an unproductive work day.

Because they take a societal perspective, most of the economic burden estimates for mental disorders rely on survey data (e.g., [1 3 4]). One of the most identifiable types of work absence is related to sickness absences. Yet, ~~F~~few estimates specifically have taken sickness absences into account. Sickness absences are defined as work absences that require a medical certification and have an associated income replacement benefit. The costs of ~~Yet,~~ these specific types of absences are not only borne by society but employers in particular. Furthermore, because they involve the workplace, employers often assume the costs and responsibilities for the interventions to address sickness absences. Thus, to effectively build the business case for employers to invest in interventions that target sickness absences related to mental disorders, it is important to identify the costs that employers recognize and directly bear. By using a comprehensive estimate of the types of costs in economic evaluations and economic models we could more accurately estimate the types of cost-saving that employers can expect with an intervention. ~~associated with sickness absences and where there can be cost savings that interventions offer.~~

The concern among employers regarding mental disorders has been fueled by the recognition that sickness absence episodes related to a mental disorder are costly and their incidence is steadily rising[5]. Estimates suggest that an episode related to a mental disorder can be double the cost of one related to a physical disorder[6]. The calculation of the ~~total~~ cost of

sickness absences related to mental disorders is comprised of ~~influenced by~~ two types of factors: (1) the number of days absent and (2) the total number of sickness absences. It can be expected that the ~~The~~ more sickness absence days, the greater the total cost of the sickness absence. In addition, high costs could be incurred with short sickness episodes if there are many repeat sickness episodes.

One approach to addressing the costs of sickness absence related to mental disorders could be to decrease the impact of both the number of episodes and their lengths~~these factors~~. This suggests that interest should extend beyond merely whether a worker returns-to-work ~~(RTW)~~. Rather, it is also important to understand the length and the frequency of sickness absence related to mental disorders. Few studies have examined the current state of knowledge about sickness absence outcomes from the employer perspective. To fill this gap, we conducted a systematic literature review to examine the sickness absence outcomes reported in the literature. These outcomes could help to identify the aspects of sickness absences that contribute to workplace burdens.

Purpose

The purpose of this paper is to examine the current state of knowledge regarding the return-to-work (RTW) outcomes of sickness absences related to mental disorders that increase workplace burdens from the perspective of the employer. The question that we addressed in this systematic review was, "Based on the existing literature, from the employer's perspective, what are the relevant economic return-to-work outcomes for sickness absences related to mental disorders?" Answers to this question can highlight the aspects of sickness absences related to mental disorders that could escalate the costs that employers face. Results of this review can point to areas that sickness absence interventions could target. They can also suggest dimensions

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along which future intervention effectiveness could be evaluated.

A secondary question we asked was, "From the employer's economic perspective, are there gaps in knowledge about the relevant return-to-work outcomes for sickness absences related to mental disorders?" In answering this question, this review takes a first tep in understanding where the knowledge in this area is and is not being produced. It also suggests areas where additional study is needed to more accurately estimate the costs of sickness absences borne by employers.~~Thus, for this review, outcomes were used to describe the characteristics of sickness absences related to mental disorders that add to workplace burdens. The purpose of this paper is to examine the current state of knowledge regarding the characteristics of sickness absences related to mental disorders that increase workplace burdens from the perspective of the employer. As such, this review is only a first step in understanding the aspects of sickness absences related to mental disorders that could escalate the costs that employers face. Results of this review can point to areas that sickness absence interventions could target. They can also suggest dimensions along which future intervention effectiveness could be evaluated as well as identify gaps in the literature.~~

METHODS

This systematic literature review used publically available peer-reviewed studies. It did not collect or use primary data. As such, it was not subject to research ethics board review.

Five electronic databases were searched for this systematic literature review: (1) *Medline Current* (an index of biomedical research and clinical sciences journal articles), (2) *Medline In-process* (an index of biomedical research and clinical sciences journal articles awaiting indexing into *Medline Current*), (3) *PsycINFO* (an index of journal articles, books, chapters, and dissertations in psychology, social sciences, behavioral sciences, and health sciences), (4) *Econlit* (an index of journal articles, books, working papers and dissertations in Economics) and (5) *Web*

of Science (an index of journal articles, editorially selected books and conference proceedings in life sciences and biomedical research). A search strategy was developed and executed for each database with a professional health science librarian (SB) (Supplementary File 1 - Search Strategy). *Medline Current*, *Medline In-process* and *PsychINFO* were searched using the *OVID* platform. *Econlit* and *Web of Science* were searched using the *ProQuest* and *Thomson Reuters* search interface, respectively. The search was completed between February 2013 and March 2013 and was limited to English language journals published between 2002 and 2013.

Eligibility Criteria

The systematic literature search focused on the characteristics of sickness absences of workers with medically certified sickness absences related to mental disorders. Sickness absence encompassed sick leave, short-term disability leave and long-term disability leave. These sickness absence benefits could be either publicly or privately sponsored. Their receipt was conditional on employment and the absence benefit was claimed with the intention of continued employment. We included studies that looked at "no cause" sickness absences such that it was not compulsory that the absence was work-related. The search focused on identifying articles about working adults between 18-65 years old who had a sickness absence related to a mental disorder. Sickness absence outcome terms (i.e., length of sickness absence, return to work, etc.) were not included in the search strategy. This was done to ensure all reported sickness absence outcomes in the literature would be captured. The reference lists of relevant studies were hand searched. Intervention studies, review articles and commentaries were excluded.

A multi-phase screening process was employed. The first phase involved screening titles. Citations that passed the first phase were evaluated for relevance based on their abstracts. Finally, those that passed the abstract screen were evaluated for content based on the full-text.

The multi-phase screening process was completed independently by two reviewers, CSD and DL. The chance agreement corrected inter-rater reliability was 0.92. Articles for which there were rater disagreements were discussed until consensus was reached.

The following eligibility criteria were used in each phase:

1. The study reported on medically certified sickness absences due to mental disorders.
2. The study sample is not from a select (i.e., clinical trial) population.
3. The study analyzed data that were collected in the year 2000 or later.
4. The study reported on sickness absence outcomes directly related to a specific absence.

Sickness absence outcomes considered for this review included length of sickness absence, not returning to work (i.e., quitting, retiring), transitioning to long term disability, returning to work, and sickness absence recurrence.

Because the 1990s was a period of global change in disability policies and accounting for publication lag, the year 2002 was used as an inclusion starting point[7]. We focused on the last decade because there were relatively fewer policy changes related to workers during this time. Studies using pre-2000 data were excluded because pre-2000 data were collected within systems that existed before many of the 1990s policy changes.

Quality Assessment

Articles that passed the three-stage screening process were then assessed for quality using the following criteria:

1. The study population is well described.
2. The data source is well described.
3. The study sample is representative of all workers in the context.
4. Mental disorders are included and reported.
5. The system of diagnosis/classification is described.

6. The sickness absence criteria are reported (i.e., pre-sickness absence days to qualify for sickness absence).
7. Sickness absence outcome measures are defined.
8. Analytical methods are described.
9. Uncertainty of estimates are reported.
10. The stated research objective is met.

One point was awarded for each criterion that was met; the maximum score was 10. Total scores between 1 and 4 points were categorized as *fair/weak* quality, those between 5 and 8 points were *good* and those between 9 and 10 points were *excellent* quality.

RESULTS

Description of Inclusion and Exclusion

The electronic literature search resulted in the identification of 3,820 unique citations (Figure 1). From these, 24 entries that were commentaries were excluded. Based on the title review, 3,577 citations were excluded. Based on abstract review, another 151 citations were excluded; this left 64 articles for full-text review. After the full-text review, 10 articles remained and their reference lists were hand searched for relevant studies. Four articles were identified in the hand search process but all were excluded during full-text review. Reasons for article exclusions were because they: (1) used pre-2000 data (n = 11), (2) did not report sickness absence outcomes directly related to a specific absence (n = 3), (3) were based on select populations (n = 44).

Insert Figure 1

Quality Assessment

Upon quality assessment, 5 of the 10 studies were rated as *excellent* and the remaining 5 as *good* (Supplementary File 2 - Quality Assessment). The identified limitations of these studies

included: non-representativeness of the working population (n = 10), outcome measure not defined (n = 4), and uncertainty of the estimate not reported (n = 3).

Overview of the Studies

Table 1 contains the descriptions of the included studies. All of the included studies used administrative data from either an employer, insurer or occupational healthcare provider. As a result, none of the studies relied on self-report. They were based on objective data to identify populations of people with a sickness absence.

Of the 10 included studies, five were from the Netherlands. Two were from Brazil, two were from Canada and another from the UK. Seven of the studies used data from single employers. The employers in the studies represented a variety of sectors in several countries including a Dutch national postal service and a telecommunication company[8-10], a Brazilian hospital[11], a Canadian resource sector organization[6 12] and a British police force[13]. The four exceptions were Barbosa-Branco et al.[14] whose study included all Brazilian workers in registered private sector companies. In addition, Koopman et al.[15] and Roelen et al.[16] based their studies on data from an occupational health provider representing a broad spectrum of firms across the Netherlands.

All of the studies except one indicated that they used the International Classification of Diseases (ICD) to identify type of disorder. Of those that used the ICD, eight of the studies used the 10th edition; one used the 8th edition. One study[15] did not describe the disorder classification system that was used. However, because it used ArboNed data that were also used by Roelen et al.[16], it might be assumed that ICD codes were also used in this study.

Among the studies, there was variability in the scope of the primary diagnoses associated with the sickness absences that were included. However, there were similarities with respect to

the inclusion of depressive and anxiety disorders and stress-related disorders. Thus, there appeared to be consistency among the studies with regard to a core set of mental disorders.

There was variation with regard to the number of absence days needed to qualify for sickness absence benefits. The number of days ranged from one to three weeks.

Table 1. Overview of Studies

Author(s)	Country	Study Population	Data Source(s)	Years of Data	Diagnostic Classification System Used	Sickness Absence Benefit Definition	Outcomes
Barbosa-Branco et al. (2012)	BR	All employees in registered private sector jobs in 2008 who a sickness absence	Brazilian National Social Security Administrative Databases: National Benefits System and National Social Information Database	2008	International Classification of Diseases,10th edition (ICD-10)	Sickness absence = ≥ 15 medically certified consecutive days absent	Duration of sickness benefit claim (calendar vs work days not specified)
Board & Brown (2011)	UK	Study sample consisted of all employees of one police force who had ≥ 1 episode of long-term sickness absence (LTSA) between Nov 1, 2000 and Oct 31, 2002	Employer electronic absenteeism record administrative data	2000-2002	International Classification of Diseases,8th edition (ICD-8)	Long-term sickness absence = medically certified sickness absence episodes ≥ 28 consecutive calendar days	Return to work by type of sickness absence episode (sub-acute or chronic)
Dewa et al. (2010)	CA	Employees from one large resource sector company from 2003-2006 who had a sickness absence	Employer administrative sickness absence data	2003-2006	ICD-10	Sickness absence = medically certified sickness absence of ≥ 5 continuous work days	Mean work days per sickness absence episode
Dewa et al. (2011)	CA	Employees from one large resource sector company from 2003-2006 who had a sickness absence	Employer administrative sickness absence data	2003-2006	ICD-10	Sickness absence = medically certified sickness absence of ≥ 5 continuous work days	Sickness absence free days
Koopmans et al. (2008)	NL	Employees of firms who were clients of one occupational health services provider from April 2002 – November 2005 who had a sickness absence.	Administrative sickness absence data from one occupational health service provider (ArboNed)	2002-2005	Not described	Not described	Return to work Duration of absence calendar days

Author(s)	Country	Study Population	Data Source(s)	Years of Data	Diagnostic Classification System Used	Sickness Absence Benefit Definition	Outcomes
Koopmans et al. (2010)	NL	Dutch Post and Telecommunication employees from 2001-2007 who had a sickness absence due to a common mental disorder since Jan 1, 2001 or date of employment	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sick leaves of > 3 weeks require a medical certificate from an occupational physician	Duration of sickness absence days (calendar vs work days not specified) Days to sickness absence recurrence
Koopman et al. (2011)	NL	Dutch Post and Telecommunication employees from 2001-2007 who had a sickness absence due to a common mental disorder	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sick leaves of > 3 weeks require a medical certificate from an occupational physician	Duration of sickness episodes Median duration in months until recurrence of sickness absence Days to sickness absence recurrence Recurrence = the start of at least one new episode of sickness absence after complete return to work for ≥ 28 days
Reis et al. (2011)	BR	Workers who worked ≥ 20 hours/week from one university hospital who were employed from 2000-2007 who had at least 1 sickness absence	Administrative data from employer human resources department	2000-2007	ICD-10	Not described	Median calendar days per sickness absence Recurrence density of sickness absence episodes/100 worker-months
Roelen et al. (2009)	NL	Employees of firms who were clients of an occupational health services provider from 2001-2007 who had a sickness absence	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sickness absence: absence of ≥ 28 sick days requiring a medical certificate from an occupational physician	Median number of calendar days of sickness absence episodes/100 employees

Author(s)	Country	Study Population	Data Source(s)	Years of Data	Diagnostic Classification System Used	Sickness Absence Benefit Definition	Outcomes
Roelen et al. (2010)	NL	Dutch Post and Telecommunication employees from 2001-2007 who had a sickness absence	Administrative sickness absence data from one occupational health service provider (ArboNed)	2001-2007	ICD-10	Sick leaves of > 3 weeks require a medical certificate from an occupational physician.	Median duration of sickness absence in days (type of day not specified) Recurrence density of sickness absence/1,000 worker-years Days to recurrence

Sickness Absence Outcomes

The outcomes reported by the studies could be grouped into two general categories. The first outcome category includes studies that examined whether and when a worker returned to work. They included RTW indicators and sickness absence duration. The second category of outcomes focused on sickness absence recurrence. These recurrence outcomes reflected the rates of recurrence as well as the time between sickness absence episodes.

Outcomes focusing on Return-to-Work. Three studies reported the rates of RTW (Table 2). Koopmans et al.[15] observed that of workers who had sickness absences due to depression, 66% returned to work within a year. Board and Brown[13] found that among their police force, 85% of police officers who had a sickness absence returned to work.

Duration of sickness absence. Duration of sickness absence was measured using three types of days – calendar days, work days and unspecified types of days. Sickness absence days were reported using two statistics – the mean days and the median days. The values of the mean and the median become equivalent when a distribution is symmetric (e.g., the normal distribution). From the Netherland studies, the median days of absence duration were between 79 and 119 days[8-10 15 16]. In addition, there were changes in the median number of days over time

such that they seemed to decrease between 2001 and 2007[16]. From Brazil, Reis et al.[11] reported a duration of 5-7 calendar days. Using Canadian data, Dewa et al.[6] reported a mean absence episode of 65 work days. From the UK, Board and Brown[13] found that 43-60% of the workers they observed had a sickness absence episode that was between 28-90 days; about 41-57% had sickness absence episodes that lasted more than 90 days.

Table 2. Return-to-Work Sickness Absence Outcomes

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Barbosa-Branco et al. (2012)	BR	Mental and behavioural disorders: Organic disorders (ICD-10 F00-F09); psychoaffective substance use disorders (ICD-10 F10-F19); schizophrenia, schizotypal and delusional disorders (ICD-10 F20-F29); mood disorders (ICD-10 F30-F39); stress-related and somatoform disorders (ICD-10 F40-F48)	Duration of sickness benefit claim = measure not described	Number of claims due to mental and behavioural disorders: All = 147,105 Males = 71,195 Females = 75,910	Median duration of disability episodes (in days) (1st and 3rd quartiles): Males: Mental and behavioural disorders = 76 (47, 113) Females: Mental and behavioural disorders = 65 (43, 97)
Board and Brown (2011)	UK	ICD categories used not described	Absence phase: Sub-acute = 28-90 days Chronic phase = > 90 days Return-to-Work = episode has start and finish dates before study end date	Number of sickness absences: Police officers = 4,485 Civilian staff = 1,761	Among those with mental ill health: Police officers: With sub-acute episode = 43.2% With chronic episode = 56.8% Who return to work = 85.2% Civilian staff: With sub-acute episode = 59.5% With chronic episode = 40.5% Who return to work = Not reported
Dewa et al. (2010)	CA (Ontario)	Mental and behavioural disorders (ICD-10 F00-F99, Z502, Z503, Z561-Z566, Z630-Z639, Z729, Z733, Z738, Z864, Z915): schizophrenia, mood disorders, stress-related disorders and mental and behavioral disorders due to psychoactive substance use	Duration of episode = number of work days absent	Number of sickness absences: Due to any disorder = 4,791 Due to mental and behavioural disorders = 698	Mean days per episode (in days) (95% Confidence Interval): Due to any disorder = 33.0 (31.3, 34.7) Due to mental and behavioural disorders: All = 64.9 (58.2, 71.6) Males = 62.1 (54.1, 70.1) Females = 70.0 (57.8, 82.1)

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Koopmans et al. (2008)	NL	Depression (Diagnostic classification system not descripted in paper)	Duration of episode = number of calendar days between first day of sick leave and date of return to work or disability pension received	Number of new episodes due to depression = 9,910	Return to work within a year: Men = 67.7% Women = 64.8% Total = 66.2% One year of work incapacity: Men = 15.2% Women = 17.4% Total = 16.4% Mean duration of episode (in days) (95% CI): Men = 200 (196, 204) Women = 213 (210, 217) Median duration of episode (in days) (95% CI): Men = 179 (172, 186) Women = 201 (193, 209)
Koopmans et al. (2010)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32.0, F32.1, F40.0, F40.1, F40.2, F41.0, F41.1, F41.2, F41.3)	Duration of sickness absence = number of calendar days between first day of sick leave and date of return to work or disability pension received	Number of employees with ≥ 1 sickness absence due to CMD = 8,951 Total number of sickness absence due to CMD = 10,921	From 2001-2007, median duration of index sickness absence episode (in days) (95% CI): Men: Stress = 49 (47, 51) Psychiatric = 168 (150, 186) Total CMD = 57 (54, 60) Women: Stress = 56 (53, 59) Psychiatric = 168 (151, 185) Total CMD = 67 (63, 71) From 2001-2007, median duration of recurrent CMD sickness absence episodes (in days) (95% CI): Men: Stress = 46 (41, 51) Psychiatric = 68 (39, 97) Total CMD = 48 (43, 53) Women: Stress = 60 (51, 69) Psychiatric = 73 (53, 93) Total CMD = 62 (55, 69)
Koopmans et al. (2011)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32, F40, F41)	Duration of sickness absence = number of calendar days of sickness absence adjusted for partial return to work and annual worker- years	Number of employees with ≥ 1 sickness absence due to CMD = 9,904 Total number of sickness absences due to CMD = 12,404	From 2001-07, duration of sickness absence episode due to CMD (in calendar days) (95% CI): Total = 62 (60, 64) Men = 57 (55, 59) Women = 68 (65, 71)

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Reis et al. (2011)	BR	Mental and behavioral disorders (ICD-10 F00-F99)	Duration of episode = Number of calendar days absent from work	Number of sickness absence episodes: Due to any disorder = 5,138 Due to mental and behavioural disorders = 324	Median duration of sickness absence leave (in days): First episode: Due to any disorder = 2 Due to mental and behavioural disorders = 5 Recurrent episodes: Due to any disorder = 2 Due to mental and behavioural disorders = 7
Roelen et al. (2009)	NL	Mental and behavioral disorders (ICD-10 R45, F43, F32, F40 and F41) from medical certification: emotional disturbance, depressive disorders, anxiety disorders and stress-related disorders	Duration of sickness absence = calendar days between the first and last day of sickness absence	Number of sickness absence episodes: Due to any disorder: 2001 = 90,095 2002 = 104,193 2003 = 118,926 2004 = 129,024 2005 = 128,044 2006 = 108,901 2007 = 96,482 Due to mental and behavioural disorders: 2001 = 21,140 2002 = 22,803 2003 = 24,917 2004 = 27,533 2005 = 22,682 2006 = 20,013 2007 = 18,513	Median duration of sickness absence episodes (in days) (95% CI): Due to any disorder: 2001 = 73 (72, 74) 2002 = 63 (62, 64) 2003 = 57 (56, 58) 2004 = 53 (53, 53) 2005 = 45 (45, 45) 2006 = 49 (48, 50) 2007 = 55 (54, 56) Due to mental and behavioural disorders: 2001 = 119 (116, 122) 2002 = 98 (96, 100) 2003 = 87 (85, 89) 2004 = 80 (79, 81) 2005 = 79 (77, 81) 2006 = 83 (81, 85) 2007 = 87 (85, 89)
Roelen et al. (2010)	NL	Mental and behavioral disorders (ICD-10 F00-F99) from medical certification	Duration of sickness absence = number of days between first day of sick leave and date of return to work or disability pension received	Number of employees with ≥1 sickness absence = 36,342 Number of employees with ≥1 sickness absence due to mental and behavioural disorders = 7,197 Number of employees with > 1 sickness absence due to mental and behavioural disorders = 1,400 Worker-years = 363,461	Median duration of sickness absence (in days) (95% CI): Mental and behavioural disorders = 62 (55, 69) Any disorder = 35 (34, 36)

Four of the studies compared sickness absence episode duration for those related to

mental disorders versus those for other disorders. The findings among the four studies were consistent; episodes for mental disorders were longer than episodes related to other types of disorders. For instance, Roelen et al.[10] reported that while the median duration of a mental disorder related episode was 62 days, it was 35 days for any type of episode. In addition, this pattern appeared to be consistent from 2001 to 2007[16]. Among their Canadian energy sector workers, Dewa et al.[6] found that the mean number of work days of an episode related to a mental disorder was almost double that of an episode related to other types of disorders (65 days versus 33 days). Reis et al.[11] reported similar patterns among their sample of Brazilian healthcare workers.

Outcomes Focusing on Sickness Absence Recurrence. Three of the studies reported rates of sickness absence recurrence related to a mental disorder (Table 3). Roelen et al.[10] reported recurrence rates of 80/1000 worker-years for mental and behavioural disorders as opposed to 82/1000 worker-years for any disorder. Reis et al.[11] found rates of 7/100 worker-months for mental and behavioural disorders and 17/100 worker-months for any disorder. In addition, Koopmans et al.[9] observed mental disorder sickness absence recurrence rates of 76/1000 worker-years for men and 79/1000 worker-years for women. They also found that 18% of workers with at least one sickness absence episode had a recurrent episode[9].

Table 3. Recurrence Sickness Absence Outcomes

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Dewa et al. (2011)	CA (Ontario)	Mental and behavioural disorders (ICD-10 F00-F99, Z502, Z503, Z561-Z566, Z630-Z639, Z729, Z733, Z738, Z864, Z915): schizophrenia, mood disorders, stress-related disorders and mental and behavioral disorders due to psychoactive substance use	Disability free days = number of between end of first episode and beginning of subsequent episode	Number of employees with ≥1 sickness absence episode: Due to mental disorders = 422 Due to physical disorders = 3,171	Median disability free days (standard error): Previous episode for mental disorders = 673 (79.8) Previous episode for physical disorders = 1053 (48.6)

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Koopmans et al. (2010)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32.0, F32.1, F40.0, F40.1, F40.2, F41.0, F41.1, F41.2, F41.3)	Recurrence density = number of employees with recurrent episodes by the worker-years in the sub-population of men and women with a previous episode of sickness absence due to a CMD New episodes = > 28 days apart Worker-years = years of coverage from index episode to end of employment period	Number of employees with ≥ 1 sickness absence due to CMD = 8,951 Total number of sickness absence due to CMD = 10,921	From 2001-2007, episodes per worker with ≥ 1 sickness absence related to CMD: 1 episode = 82% 2 episodes = 14% 3 episodes = 3% ≥ 4 episodes = 1% From 2001-07, CMD recurrence densities/1,000 worker-years (95% CI): Men: Stress = 74.4 (72.9, 76.0) Psychiatric = 83.8 (71.9, 95.7) Total CMD = 75.6 (70.7, 80.4) Women: Stress = 78.4 (75.9, 80.9) Psychiatric = 78.9 (64.1, 93.7) Total CMD = 78.5 (72.4, 84.6) From 2001-07, CMD sickness absence median time to onset recurrence (in months) (95% CI): Men: Stress = 11 (11, 13) Psychiatric = 12 (8, 15) Total CMD = 11 (10, 13) Women: Stress = 11 (9, 12) Psychiatric = 10 (8, 12) Total CMD = 10 (9, 12)
Koopmans et al. (2011)	NL	Common mental disorders (CMD) from medical certification: stress-related (distress and adjustment disorders) (ICD-10 R45, F43) and psychiatric (mild to moderate depressive and anxiety disorders) (ICD-10 F32, F40, F41)	Recurrence density = number of employees with recurrent episodes by the worker-years in the sub-population of men and women with a previous episode of sickness absence due to a CMD Worker-years = years of coverage from index episode to end of employment period	Number of employees with ≥ 1 sickness absence due to CMD = 9,904 Total number of sickness absences due to CMD = 12,404	From 2001-07, CMD sickness absence median time to onset recurrence (in months) (95% CI): Total = 10 (10, 11) Distress symptoms = 11 (10, 12) Adjustment disorder = 11 (9, 12) Depressive symptoms = 10 (7, 12) Anxiety symptoms = 10 (7, 14) Other CMD disorders = 8 (6,9)

Author(s)	Country	Mental Disorders	Outcome Measure	Number of episodes or employees	Reported Outcomes of Sickness Absences
Reis et al. (2011)	BR	Mental and behavioral disorders (ICD-10 F00-F99)	Duration of episode = Number of calendar days absent from work Recurrence density = number of recurrent sickness absences divided by total worker-time at risk for the subsequent sickness absences	Number of sickness absence episodes: Due to any disorder = 5,138 Due to mental and behavioural disorders = 324	Recurrence density/100 worker-months: Due to any disorder = 17.37 Due to mental and behavioural disorders = 6.72
Roelen et al. (2010)	NL	Mental and behavioral disorders from medical certification (ICD-10 F00-F99)	Recurrence density = number of employees with recurrent episodes by the worker-years in the sub-population of men and women with a previous episode of sickness absence	Number of employees with ≥1 sickness absence = 36,342 Number of employees with ≥1 sickness absence due to mental and behavioural disorders = 7,197 Number of employees with > 1 sickness absence due to mental and behavioural disorders = 1,400 Worker-years = 363,461	From 2001-2007, Recurrence density/1,000 worker-years (95% CI): Mental and behavioural disorders = 80.4 (74.9, 86.0) Any disorder = 81.6 (79.1, 84.0) Median days to recurrence (in days) (95% CI): Mental and behavioural disorders = 328 (284, 372) Any disorder = 384 (367, 401)

Time between Sickness Absence Episodes. Four studies reported the time between episodes related to mental disorders. Koopmans et al.[8] found that the median time was 10 months. In addition, Koopmans et al.[9] observed the median lengths of episode free-months were similar for men (11 months) and women (10 months).

Roelen et al.[10] compared lengths of episode free-days for those related to mental disorders versus those related to any disorder. They found the median length of episode free days was longer for workers who had a previous sickness absence episode for any disorder (384 days) versus those who had a previous episode related to a mental disorder (328 days). Dewa et al.[12] also observed a longer period of sickness absence free days for workers who had a previous sickness absence episode related to a physical disorder (1053 days) than those who had a previous sickness absence episode related to a mental disorder (673 days).

DISCUSSION

Based on the existing literature from the employer's perspective, what are the relevant return-to-work outcomes for sickness absence related to mental disorders? The results of the 10 studies could be grouped into two general outcome categories: (1) outcomes focusing on return-to-work and (2) outcomes focusing on sickness absence recurrence. ~~This systematic literature review identified 10 studies that ranged from good to excellent quality. The results of the studies could be grouped into two general categories: (1) outcomes focusing on return-to-work and (2) outcomes focusing on sickness absence recurrence. These studies suggest that these are two areas of workplace burden to employers.~~

Two of the included studies that looked at RTW outcomes indicated that the majority of workers who have a sickness absence return to work at the end of the absence[13 15]. This trend is consistent with early studies that indicated a large proportion of workers return to work at the end of their absence[17 18]. This suggests that retention of workers may not be one of the major burdens associated with sickness absence. It also raises the question of what happens to workers who do not return to work at the end of their sickness absence. This is particularly salient for North American (i.e., United States and Canada) employers who offer long-term work disability benefits to their workforces. Although a small group, workers who receive long-term disability benefits after reaching the limits of their sickness absence benefits could represent high costs. One estimate suggested that it could cost CAN $80,000 per long-term disability claim[5].

The results of the studies suggest that sickness absence duration ranges from 5-119 days. The variation among the estimates may reflect the variation among the sickness benefit schemes of the jurisdictions in which the studies were conducted. However, there were consistencies among a number of reported patterns. For example, the numbers of sickness absence days

related to mental disorders were greater than those for physical disorders in the four studies that reported them[6 9 14 15]. In addition, compared to absences related to physical disorders, those related to mental disorders may be of greater length and in turn, burden.

With regard to sickness absence recurrence, the studies that calculated recurrence rates reported rates that ranged from 7/100 worker months to 80/1,000 worker-years. While there is variation in the magnitudes of the reported rates, two studies also indicated that the time between a sickness absence recurrence is consistently longer for workers who had a past sickness absence related to a physical disorder versus a mental disorder. However, while the pattern seemed to be consistent, the median numbers of sickness absence free days were two to three times greater in Dewa et al.'s[12] study than Roelen et al.'s[10]. Because workers within these respective studies are exposed to the same sickness benefit scheme, the differences within the studies suggest there may be other potential contributors to the differences than solely the sickness benefit scheme. There is an opportunity for future research to explore the role that individual (e.g., the chronic nature of mental disorders), occupational (e.g., job characteristics) and environmental (e.g., workplace stigma) factors play in the differences in the recurrence of physical versus mental disorder related sickness absences.

These results also suggest that although most workers return to work, they also may be at ~~higher~~ risk of a repeat sickness absence episode. Indeed, the literature suggests that mental disorders usch as depression are chronic in nature and have a high recurrence rate.[19-21] However, does symptom relapse automatically necessitate an accompanying sickness absence? Given that work disability is not solely a medical problem, there have been suggestions that eh prognosis need to be fatalistic; sickness absence is not always required. For example, workplace accomodations could help workers experiencing an episode of mental illness continue to work

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during an episode.[22 23] In addition, there is an emerging literature looking at the effectiveness of interventions in decreasing sickness absence recurrence for mental disorders.[24 25] That is, although there have been arguments for treating mental disorders as chronic illnesses, there have been few intervention studies that have focused on decreasing sickness absence recurrence for mental disorders.

This also points to one of the gaps in the literature. ~~While there have been~~ Ffew studies have estimated ~~estimating~~ the cost of work re-integration and accommodation for workers with mental disorders. None of the studies identified in this review examined the time it took for a worker to completely reintegrate back into work. For example, how long is the work accommodation period? Furthermore, how is productivity affected during the reintegration period? ~~,~~ T~~t~~here is evidence suggesting that there may be costs to the workplace related to the process of re-integrating a worker who has been absent because of a sickness episode[19-21]. ~~Moreover,~~ Thre also ~~there~~ is evidence to suggest that employers and workers have identified work sustainability without sickness absence recurrence as an important work outcome[22]. Given that work sustainability without sickness absence recurrence seems to be a preference of both workers and employees and there are potential costs related to reintegration, these findings suggest that it may be important to consider number of episodes as well as total number of absence days alone. Few burden of illness studies for mental disorders have included the costs of recurrent sickness absence in their estimate. But, recurrent sickness absences episodes seem to be a cost that warrants consideration for inclusion in cost estimates as well as for intervention outcomes. ~~It is also an area that warrants further research to understand the costs associated with the re-integration process.~~

In addition, five of the 10 studies identified are from one country (the Netherlands) and

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two population groups within that country. At the same time, the databases that were used represented between 10,000 and 100,000 claims. Thus, the findings that emerge from these databases build a compelling case that the length of sickness absence and its recurrence is a burden on employers. However, the fact that the majority of the evidence is being generated by one country raises interesting questions. Is the reason that the Netherlands and Northern Europe are the sournces of most of the intervention studies for sickness absences related to mental disorders because they have compelling data to make the case about the costs to employers? Are the results from the Netherlands generalizable to other countries?

In addition to Dutch studies, there were five other studies identified. However, these studies actually represented a total of four population groups. Three of the dataset each represented about 5,000 claims from single organizations (the studies from the UK, Canada and one Brazilian study). The exception was the one Brazilian study that represented 140,000 claims (all workers in registered private sector jobs). This suggests that there is an opportunity for the evidence base to group in these countries. It also begs the question, "What is known about the sickness absences burden in other countries that were not represented in this search (i.e., the US, the missing EU countries and Asia)? Does the absence of studies from other countries indicate that it is not a concern in the other countries? Or, is it an indication that awareness is yet to be raised?

~~It should be noted that the sickness absence outcomes that have been studied are related to the potential direct costs to employers. That is, because of the effect on work productivity, employers will be interested in the length of sickness absences as well as recurrence of sickness absence. However, from a societal perspective, this presents only part of picture. What happens to workers who do not return to work? This is a question governments may want answered~~

~~especially if it means that those workers become enrolled in the public disability programs[23]. Thus, future work should also examine this group of workers particularly if factors can be identified that retain them in the labour market.~~

Strengths and Limitations Related to Interpreting the Literature

There were a number of strengths of the current body of literature reviewed. First, all of the data from the included studies used data from complete populations of people who had a sickness absence. This minimizes the potential for selection bias within populations. However, selection bias related to the population chosen is still a possibility. Indeed, there was variation in the populations covered ranging from multiple to single organizations. Consequently, it will be important for future work to examine whether the results are generalizable to different populations.

An additional strength of the included studies was that they used standardized diagnostic classification systems. All included depressive and anxiety disorders as well as stress-related disorders. However, there was variability in the other types of mental disorders considered. This could have affected some of the reported results. At the same time, it should be noted that the majority of sickness absences related to mental disorders are attributable to depression, anxiety and stress-related disorders[24 25]. This suggests that inclusion of these disorders would capture a large proportion of the sickness absences related to mental disorders.

A limitation of the studies was the variation in the years from which the data were taken. Although all studies used post-2000, there could have been changes within systems that could have affected incidence rates. For example, in the Netherlands, extensive legislative changes occurred between 2000 and 2013 which affected rates[7 26]. In fact, the changes are reflected in the results reported by Roelen et al.[16]. Similarly, changes could have been implemented in other

countries such that results may not currently be generalizable.

Another limitation was variability in the sickness absence benefit schemes. That is, the variation in the length of sickness absence episodes in part could be related to the length of sickness absence coverage. The longer the coverage, the longer the absence may be. The frequency of sickness absence recurrence also could be affected by the benefit scheme. If there are limits on the number of sickness absence days that a worker is allowed annually, those workers could have fewer episodes than workers for whom limits do not exist.

Strengths and Limitations of the Search Strategy

Although five databases were used in the search, articles that did not appear in any of the databases could have been overlooked. This possibility was decreased due to the broad scope of each of the searched databases and the hand search. Another limitation is related to the fact that the search focused on articles published in English-language journals. However, despite the English-language constraint, the identified studies originated in European, North American and Latin American countries. This indicates that although they are not in countries where English is the first language, at least some of these researchers publish in English-language journals.

It should be noted that the sickness absence outcomes that have been studied are related to the potential direct costs to employers. That is, because of the effect on work productivity, employers will be interested in the length of sickness absences as well as recurrence of sickness absence. However, from a societal perspective, this presents only part of picture. What happens to workers who do not return to work? This is a question governments may want answered especially if it means that those workers become enrolled in the public disability programs[23]. Thus, future work should also examine this group of workers particularly if factors can be identified that retain them in the labour market.

CONCLUSIONS

This systematic literature review identified only 10 studies published in the last decade. The results of these existing studies suggest that along with the incidence of sickness absence related to mental disorders, the length and recurrence (e.g., frequency of recurrence and time between recurrence) of these sickness absences should be areas of concern.

This systematic review also highlights gaps in the literature. For instance, half of the existing studies are from the Netherlands. That is, most of the literature in this area is based on the Netherland's experience. This suggests that in other parts of the world, this area of research is in its infancy. It will be important for research in other countries to look at the length and recurrence (i.e., frequency of recurrence and time between recurrences) of sickness absences. This basic knowledge will help with understanding to what extent it should be a concern for employers in other countries. In turn, it could also help to build the business cases for increased resources toward the development of more sickness absence interventions in these other countries.

~~Five of them were from the Netherlands. This suggests that this is an emerging area of research.~~ The results of these studies also indicate ~~suggest~~ that we are in the early stages of understanding the aspects of sickness absences that contribute to their burden and along the same vein~~in the process~~, areas to target to effectively decrease their costs. For example, more research is needed regarding the costs of sickness absence recurrence including the cost of reintegration and time to full reintegration. This suggests athat current cost estimates may underestimate the costs of sickness absences from the employer's perspective. To effectively build the business case for employers to invest in interventions that target sickness absences related to mental disorders, it will be important to develop a more comprehensive picture of the costs associated

with sickness absence that employers directly bear. Only in this way can economic evaluations and economic models accurately estimate the types of cost-savings that employers can expect with an intervention. ~~At the same time, there are patterns in the results that could be useful in developing interventions. The results of these studies suggest that along with the incidence of sickness absence related to mental disorders, the length and recurrence (i.e., frequency of recurrence and time between recurrence) of these sickness absences should be areas of concern. Thus, it may be important to evaluate interventions with respect to these two aspects of sickness absences.~~

DATA SHARING STATEMENT

All the published papers used in this manuscript are publicly available. There are no data available.

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COMPETING INTERESTS

The authors declare that they have no competing interests.

CONTRIBUTORSHIP STATEMENT

CSD led the conception, design, data acquisition, analysis and interpretation of the data; she also led the writing of the overall manuscript. DL collaborated on the design, data acquisition and analysis; he contributed to the writing of the overall manuscript and led the writing of the Methods section. SB collaborated on the design and data acquisition and contributed to the writing of the manuscript. All authors are guarantors of the final manuscript.

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Search Strategy

Database: Medline Current

Search Terms: [exp Mental Disorders/ OR exp Mentally Ill Persons/ OR (mental adj3 disorder$).mp. OR (mental$ adj3 ill$).mp. OR (psychiatric$ adj3 disorder$).mp. OR (psychiatric$ adj3 ill$).mp. OR exp Substance-Related Disorders/ OR exp "Diagnosis, Dual (Psychiatry)"/ OR (concurrent$ adj3 disorder$).mp. OR (dual$ adj3 diag$).mp. OR (alcohol$ adj3 abus$).mp. OR (alcohol$ adj3 depend$).mp. OR (substance$ adj3 abus$).mp. OR (substance$ adj3 depend$).mp. OR (drug$ adj3 abus$).mp. OR (drug$ adj3 depend$).mp. OR addiction$.mp.] **AND** [exp Absenteeism/ OR exp Sick Leave/ OR exp Return to Work/ OR exp Personnel Turnover/ OR Social Welfare/ OR Public Assistance/ OR exp Insurance Disability/ OR exp Insurance Benefits/ OR exp Salaries/ OR exp Fringe Benefits/ OR exp Social Security/ OR exp Retirement/ OR (sick$ adj3 day$).mp. OR (illness$ adj3 leave$).mp. OR (disabilit$ adj3 leave$).mp. OR (short term disabilit$).mp. OR (long term disabilit$).mp. OR (work$ adj3 absence$).mp. OR (return$ to work$).mp. OR (work$ adj3 turnover$).mp. OR (employ$ adj3 turnover$).mp. OR (disabilit$ benefit$).mp. OR (employ$ benefit$).mp. OR (work$ benefit$).mp. OR (sick$ benefit$).mp. OR (incapacit$ benefit$).mp. OR (social$ welfar$).mp. OR (public$ assistanc$).mp. OR (insurance$ disabilit$).mp. OR (insurance$ benefit$).mp. OR (old$ age$ assistanc$).mp. OR (social$ securit$).mp. OR retire$.mp.] **AND** [sn.fs. OR ep.fs. OR preval$.mp. OR incid$.mp. OR statistic$.mp. OR exp Epidemiologic Methods/]

Database: Medline In-process

Search Terms: [exp Mental Disorders/ OR exp Mentally Ill Persons/ OR (mental adj3 disorder$).mp. OR (mental$ adj3 ill$).mp. OR (psychiatric$ adj3 disorder$).mp. OR (psychiatric$ adj3 ill$).mp. OR exp Substance-Related Disorders/ OR exp "Diagnosis, Dual (Psychiatry)"/ OR (concurrent$ adj3 disorder$).mp. OR (dual$ adj3 diag$).mp. OR (alcohol$ adj3 abus$).mp. OR (alcohol$ adj3 depend$).mp. OR (substance$ adj3 abus$).mp. OR (substance$ adj3 depend$).mp. OR (drug$ adj3 abus$).mp. OR (drug$ adj3 depend$).mp. OR addiction$.mp.] **AND** [exp Absenteeism/ OR exp Sick Leave/ OR exp Return to Work/ OR exp Personnel Turnover/ OR Social Welfare/ OR Public Assistance/ OR exp Insurance Disability/ OR exp Insurance Benefits/ OR exp Salaries/ OR exp Fringe Benefits/ OR exp Social Security/ OR exp Retirement/ OR (sick$ adj3 day$).mp. OR (illness$ adj3 leave$).mp. OR (disabilit$ adj3 leave$).mp. OR (short term disabilit$).mp. OR (long term disabilit$).mp. OR (work$ adj3 absence$).mp. OR (return$ to work$).mp. OR (work$ adj3 turnover$).mp. OR (employ$ adj3 turnover$).mp. OR (disabilit$ benefit$).mp. OR (employ$ benefit$).mp. OR (work$ benefit$).mp. OR (sick$ benefit$).mp. OR (incapacit$ benefit$).mp. OR (social$ welfar$).mp. OR (public$ assistanc$).mp. OR (insurance$ disabilit$).mp. OR (insurance$ benefit$).mp. OR (old$ age$ assistanc$).mp. OR (social$ securit$).mp. OR retire$.mp.] **AND** [sn.fs. OR ep.fs. OR preval$.mp. OR incid$.mp. OR statistic$.mp. OR exp Epidemiologic Methods/]

Database: PsycINFO

Search Terms: [exp Mental Disorders/ OR exp Psychiatric patients/ OR (mental adj3 disorder$).mp. OR (mental$ adj3 ill$).mp. OR (psychiatric$ adj3 disorder$).mp. OR (psychiatric$ adj3 ill$).mp. OR exp Drug Abuse/ OR exp Drug Addiction/ OR exp Drug Dependency/ OR exp Alcohol Abuse/ OR exp Addiction/ OR exp Dual Diagnosis/ OR (concurrent$ adj3 disorder$).mp. OR (dual$ adj3 diag$).mp. OR (alcohol$ adj3 abus$).mp. OR (alcohol$ adj3 depend$).mp. OR 321$.cc.[psychological disorders class code] OR 3233.cc.[Substance abuse & addic class code] OR (substance$ adj3 depend$).mp. OR (drug$ adj3 abus$).mp. OR (drug$ adj3 depend$).mp. OR addiction$.mp.] **AND** [exp Employee Absenteeism/ OR (absenteeism$).mp. OR exp Employee Leave Benefits/ OR exp Reemployment/ OR exp Employee Turnover/ OR (social welfar$).mp. OR exp Insurance/ OR exp Salaries/ OR exp employee benefits/ OR exp Social Security/ OR exp Retirement/ OR (sick$ adj3 day$).mp. OR (illness$ adj3 leave$).mp. OR (disabilit$ adj3 leave$).mp. OR (short term disabilit$).mp. OR (long term disabilit$).mp. OR (work$ adj3 absence$).mp. OR (return$ to work$).mp. OR (work$ adj3 turnover$).mp. OR (employ$ adj3 turnover$).mp. OR (disabilit$ benefit$).mp. OR (employ$ benefit$).mp. OR (work$ benefit$).mp. OR (sick$ benefit$).mp. OR (incapacit$ benefit$).mp. OR (social$ welfar$).mp. OR (public$ assistanc$).mp. OR (insurance$ disabilit$).mp. OR (insurance$ benefit$).mp. OR (old$ age$ assistanc$).mp. OR (social$ securit$).mp. OR retire$.mp.] **AND** [preval$.mp. OR incid$.mp. OR statistic$.mp. OR exp Epidemiology/ OR ext Data collection/ OR epidemiolog$.mp. OR (data collection$).mp. OR survey$.mp. OR questionnair$.mp.]

Database: Econlit

Search Terms: [mental disorder* OR mental disorder* OR mental ill* OR psychiatric* OR concurrent* disorder* OR dual* diag* OR alcohol* OR substance* abus* OR substance* depend* OR drug* abus* OR drug* depend* OR addic*] **AND** [absent* OR sick* OR ill* OR disabilit* leav* OR short term disabilit* OR long term disabilit* OR work* OR absence* OR return* to work* OR work* turnover* OR employ* OR benefit* OR welfar* OR public* assistanc* OR insurance* OR old* age* assistanc* OR social securit* OR retire*]

Database: Web of Science

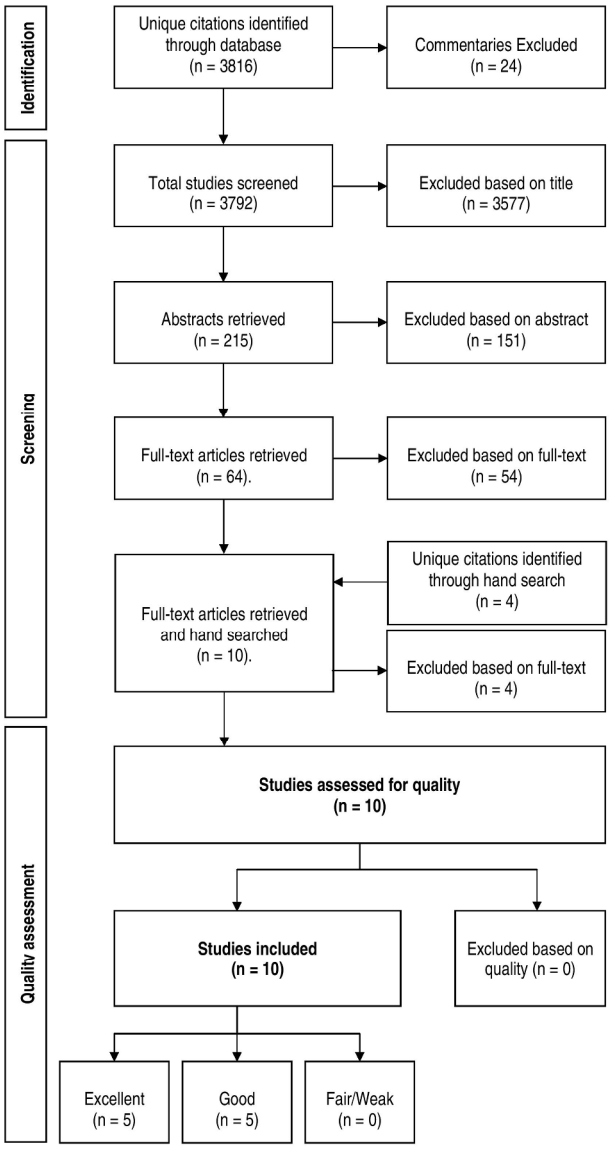
Search Terms: [mental disorder* OR mental ill* OR psychiatric* disorder* OR psychiatric* ill* OR concurrent* disorder* OR dual* diag* OR alcohol* abus* OR alcohol* depend* OR substance* abus* OR substance* depend* OR drug* abus* OR drug* depend* OR addiction*] **AND** [absenteeism* OR sick* day* OR illness* leave* OR disabilit* leav* OR short term disabilit* OR long term disabilit* OR work* absence* OR return* to work* OR work* turnover* OR employ* turnover* OR disabilit* benefit* OR employ* benefit* OR work* benefit* OR sick* benefit* OR incapacit* benefit* OR social* welfar* OR public* assistanc* OR insurance* disabilit* OR insurance* benefit* OR old* age* assistanc* OR social securit* OR retire*] **AND** [preval* OR incid* OR statistic* OR epidemiolog* OR data collection* OR survey* OR questionnair*]

Quality Assessment Checklist

Author(s)	Year	1	2	3	4	5	6	7	8	9	10	Total
Barbosa-Branco et al	2012	1	1	0	1	1	1	0	1	0	1	7
Board & Brown	2011	1	1	0	1	1	1	1	1	0	1	8
Dewa et al	2010	1	1	0	1	1	1	1	1	1	1	9
Dewa et al	2011	1	1	0	1	1	1	1	1	1	1	9
Koopmans et al	2008	1	1	0	1	0	0	0	1	1	1	6
Koopmans et al	2010	1	1	0	1	1	1	0	1	1	1	8
Koopmans et al	2011	1	1	0	1	1	1	1	1	1	1	9
Reis et al	2011	1	1	0	1	1	0	0	1	0	1	6
Roelen et al	2009	1	1	0	1	1	1	1	1	1	1	9
Roelen et al	2010	1	1	0	1	1	1	1	1	1	1	9
Total		10	10	0	10	9	8	6	10	7	10	

Quality Assessment Criteria

1. The study population is well described
2. The data source is well described
3. The study sample is representative of all workers in the context
4. Mental disorders are included and reported
5. The system of diagnosis/classification is described
6. The sickness absence criteria are reported (i.e., pre-sickness absence days to qualify for sickness absence)
7. Sickness absence outcome measures are defined
8. Analytical methods are described
9. Uncertainty of estimates are reported
10. The stated research objective is met



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PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4-6
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	5-6
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	N/A
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	6-8
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	6
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Supp. File 1
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	6-8
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	N/A
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	6-8
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	8
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N/A
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	N/A

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	8
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	8-9, Figure 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	9-10, Table 1
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Supp. File 2
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	12-19, Table 2-3
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	20-23
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	23-25
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	25-26
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	26

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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