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To what extent have improvements in level or eligibility of disability benefits acted as disincentives for employment? A systematic review of evidence from countries with well-developed welfare systems.

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Introduction

Dramatic rises in the number of people claiming disability benefits in several OECD countries over recent decades have lead to concerns about the social and economic exclusion of disabled people and the costs of income support for these groups [1-5]. Evidence from the UK and Sweden indicates a social gradient in the employment of chronically ill and disabled people, with employment rates declining with declining socioeconomic status [6-7]. Worklessness increases the risk of poverty and social exclusion which may further damage health and exacerbate health inequalities.

One aim of disability policy is to provide adequate income security to people with a health condition or impairment when they are ~~too ill~~unable to work. Economists have long debated the effects of welfare programmes, with some arguing that the level of provision of income security benefits ~~themselves~~ acts as a disincentive to labour force participation [8]. Several ~~-~~authors ~~in the US~~ have concluded that the increase in the availability of disability benefits is responsible for most of the decline in labour force participation amongst older men in ~~that country~~the US [9-11]. These econometric studies have, however, been criticised for inaccurately estimating the disincentive effects of disability benefits [12-15].

The empirical evidence that ~~does exist to support~~supports the hypothesis that disability benefits are major disincentives for work ~~largely comes from studies in the United States (US)~~comes largely from studies in the US. ~~, but it would be unsound to generalise from the US context to countries with more extensive welfare systems.~~ Compared to more extensive welfare systems, however, ~~The~~ consequences for disabled people of not being employed are very different in the US where there are fewer safety nets, no universal health care system, and employer-provided health insurance ~~is often provided through an employer and~~that is lost when a person loses that employment. Thus, it is would be unwise to generalise to other welfare systems from the US experience. This paper aims

to ~~There is a need to~~ synthesise the evidence on the question of employment disincentives in the context of advanced welfare systems~~, which is the aim of this paper~~.

We conducted a systematic review of the evidence from 5 countries with well-developed welfare and universal healthcare systems to answer the following review question: "To what extent do the generosity or eligibility requirements of disability benefit programmes affect labour market participation?" These countries have implemented numerous policies over the past 30 years to alter benefit generosity and eligibility (see Appendix 1), providing an opportunity to exploit these natural policy experiments. More recently, policy makers in these countries have begun to experiment with reducing the generosity and narrowing the eligibility criteria for these benefits, on the assumption that this will increase the employment of people with chronic illness and disabilities. This strategy underpins the introduction of the Employment Support Allowance in the UK in 2008, the 2008 reforms of the Swedish Sickness Insurance System, the 2003 reforms of disability benefits in Denmark and the 2004 disability benefit reforms in Norway [3-5, 16]. Whilst there has been a traditional review assessing the factors that have contributed to recent increases in disability benefits recipients in the UK [17], to our knowledge this is the first systematic review to address this issue and to take into account the relevance of the welfare system context.

Methods

Through our search and selection strategy we sought to identify all empirical studies from Canada, Denmark, Norway, Sweden and the UK that addressed the research question given above. We restricted our review to studies from these countries as they have sufficiently similar social welfare systems and policy contexts for cross-country policy learning to be relevant.

Searches

We searched 13 databases (Appendix 2) from 1970 to October 2008. In addition grey literature searches were conducted on 12 relevant governmental and non-governmental organisational web sites (Appendix 2). This included a supplemental search at the Library of the University of Copenhagen. A comprehensive list of linked search terms was used, with terms associated with the policy, the population and the outcome (Appendix 3). Websites were searched using a search engine which allowed for site specific searches with multiple search terms linked with Boolean commands [18].

Selection

The searches identified 3077 potentially relevant studies. Following selection using the inclusion criteria in Table 1 and validity assessment detailed in Appendix 2, a total of 16 studies were included in the final review (figure 1).

We defined disability benefits as, "state supported income replacement benefits paid to individuals out of the labour market for over 3 months due to health problems or disabilities". We therefore excluded studies that primarily investigated the effect of economic incentives on short term sickness absence. We also excluded studies which did not investigate the effect of disability benefit programmes on movement into or out of the labour market, e.g. those that only analysed movement between different benefit schemes. We defined eligibility requirements as any criteria or procedures the applicant needs to meet, or undergo in order to be eligible for disability benefits.

Table 1. Criteria used to select studies for data collection and validity assessment

Study Design. All quantitative study designs.
Participants/ population: Working age (16-69) people or a subset of this population in Canada, Denmark, Norway, Sweden or the UK, from 1970 to the 2008
Intervention. Changes to, or differences in, the generosity and/or eligibility requirements of disability benefits.
Outcome measures: -Effect on the probability of being in employment and/or being on disability benefits. -Length of time on disability benefits. -length of time off work or not in employment.

The lead reviewer excluded papers that were considered irrelevant, based on their titles and abstracts. The remaining studies were then evaluated separately by two reviewers against the inclusion criteria and validity assessment. A standardised form was used to collect data on the key characteristics of each study and carry out the validity assessment. Where results of multiple models are given in the papers reviewed, the results of the fullest or final model are presented here.

Validity Assessment

Econometric studies were the only study type identified through this review. There are no standard tools available for the appraisal of econometric studies[19]. After consultation with an expert in synthesis of econometric studies (N.Rice, York University), a simple quality appraisal framework was developed using core epidemiological principles for assessing validity (Appendix 2) [20-22].

A total of 28 studies underwent validity assessment, of which 12 were excluded by the process [23-33]. The excluded studies had adopted a similar strategy to that criticised by Bound (1989). Whilst they used regression models to compare the labour force participation of those with different disability benefit levels, the difference in disability benefit levels were due to the application of the benefit rules rather than a change in those rules resulting from policy decisions. The variation in benefit levels in these studies was therefore determined to a large part by other factors such as age, level of disability, prior earnings or number of dependants, each of which would have a direct independent effect on labour market participation. Bound (1989, 1991) argues that this analytical strategy significantly overestimates the impact of disability benefits on labour market attachment[13, 15]

Results

Sixteen studies were included from 4 countries: 8 from Canada, 5 from the UK, 2 from Sweden and one from Norway. No studies from Denmark met the inclusion criteria. The studies included investigated both changes in benefit generosity and eligibility criteria (see Table 2). The main findings are presented for each country separately to take into consideration the country policy and labour market context.

Table 2: ~~TThe ty~~typologies~~s~~ of policy changes ~~investigated by studies included in the review~~evaluated by studies included in the review

Type of policy changes investigated	Number of studies	
Differences in benefit generosity only	9	[34-42]
Changed eligibility requirements only	3	[43-45]
Both changes in eligibility requirements and benefit generosity as separate parameters in the same model	2	[34, 46]
Policy change that included a combination of changes to eligibility requirements and benefit generosity	2	[47-48]

Studies investigating Canadian policy changes

Seven of the eight studies from Canada assessed the impact of changes in the Canadian/ Quebec Pension Plan (CPP/ QPP) [34-35, 37, 43-44, 46, 49], and one study investigated the impact of variations in benefits from various sources [36] (see Table 2). The majority of studies (6/8) investigated effects on men only and most only reported on people over the age of 45 (7/8). Two of

these studies investigated changed eligibility requirements [43-44], 4 investigated benefit generosity [35-37, 49] and 2 investigated both [34, 46].

Of the four papers that investigated changes in the CPP/QPP eligibility requirements, one of these found that there was no association between increased rejection rates (indicating more stringent assessment criteria) and labour market participation[44]. Two studies found that some periods of relaxed eligibility were significantly associated with an *increase* in labour market participation, whilst others had no significant effect. The fourth study found that a relaxation of eligibility criteria, that allowed assessors to take into account local labour market conditions in deciding on ~~elligibility~~eligibility, was significantly associated with a decrease in employment [43].

Of the six Canadian papers that investigated the effect of differences in benefit replacement rates or benefit levels, four reported that higher benefit levels or replacement rates during the late 1980s and early 1990s were associated with lower male employment [34-37] . These studies did not control for education level [34, 36] and health status [35, 37]. One of these studies concluded that although the level of disability benefits did discourage labour force participation, the disincentive effects of low wages had a much greater effect [36]. Two studies found that changes in benefit levels had no significant effect [46, 49]. One of these investigated changes that occurred to benefit levels in 1973 [49] and the other investigated the effect of changes in replacement rates between 1983 and 1997 [46]. This second study found that the effect of changing replacement rates on women was in the opposite direction to that hypothesised by the study: higher replacement~~s~~ rates were associated with higher levels of female labour market participation (p=0.052).

Table 3. Studies investigating policy changes and differences between jurisdictions in Canada

Author	Population	Study type	Description of policy under analysis	Result – regression coefficient (p-value)	Comments	VA
Campolieti (2004)[49]	Men aged 45-64	Difference~~s~~ in differences with individual data	1973 policy change increasing QPP benefits by $50(CAD) a month.	Linear regression of policy change on non-employment. 45-64year olds: 0.008 (p=0.3) 45-59 year olds: 0.001 (p=0.48)	The authors concluded that all the difference-in-difference estimates suggested that the disincentive effects associated with disability benefits would be economically small and not statistically significant at that time. No control for health status or labour market conditions.	13
Campolieti and Goldenberg, (2007)[44]	Men and Women 45-64 years old	Difference~~s~~ in differences with individual data	Changes in the eligibility and medical screening criteria occurring in mid 1990s and differences between QPP and CPP and between CPP regions.	Linear regression of benefit rejection rates on non-participation Men 0.646 (p=0.166) Women 0.02 (p=0.297)	The authors concluded that they did not find a statistically significant negative relationship between denial rates and the labour force non-participation of older men and women. Health status not sufficiently controlled.	13
Harkness (1993) [36]	Prime aged men with self reported disability	Cross-sectional survey	Level of expected disability pension (combination of CPP, WCB, private insurance payments)	Logistic Regression of benefit level on labour force participation -0.00019 (p=0.006) Elasticity=- 2.03	The authors concluded that disability benefits did discourage work, but the disincentive effects of low wages were greater. Level of education not controlled.	11
Gruber (2000)[35]	Men 45-59	Difference~~s~~ in differences with individual data	1987 increase in the CPP benefit level to bring it to the level of the QPP	Logistic regression of policy and replacement rate on non-labour market participation in two separate models Policy change= 0.15 (OR=1.16)(p=0.02) Replacement rate: 1.344 (OR=3.8) (p=0.009) Elasticity = 0.28	The authors concluded that both models showed a significant effect of increases in benefit levels and the replacement rate in reducing labour market participation. Health status not controlled.	11
Campolieti, (2003)[43]	Men aged 45-65	Difference~~s~~ in differences with individual data	1989 change in CPP eligibility ~~requirments~~requirements permitting the use of socioeconomic conditions (~~e.g~~e.g. regional unemployment) in assessing eligibility for disability benefits	Linear regression on labour market participation 0.015 (p=0.016)	The authors concluded ~~that that~~that the relaxation in eligibility requirements reduced the labour supply of older men in Canada by 1.5%. Health status, wages and benefit levels not controlled.	11
Campolieti, (2001b) [46]	Men and Women 45-65	Difference~~s~~ in differences with ecological data	1. Average replacement rate between 1983 and 1997 ~~2.Relaxed~~2. Relaxed CPP eligibility criteria between 1987 and 1994 3. Relaxed QPP eligibility between 1993 and 1997 4. QPP early retirement provision	Linear regression on labour force participation Men 1:Men: - 0.2450 (p=0.9),Women: 0.1341 (p=0.052) 2: Men: 0.0251(p=0.04), Women: -0.0088 (p=0.9) 3: Men: -0.0082 (p=0.2), Women: 0.0142 (p=0.02) 4: Men: -0.0478 (p<0.001), Women: 0.0008 (p=0.4)	The authors concluded that some of these estimates did not support the hypothesis that looser eligibility rules decrease participation rates since they were not statistically significant or did not have the expected sign. The change in replacement rate was not significant for men in the full model. Increasing replacement rates were associated with increased employment in women in the full model, although this was not significant. Education level was not controlled for in the models and the health status control was inadequate.	10
Campolieti(2001)[34]	45-64 year old men	Difference~~s~~ in differences with ecological data	1. Replacement rate of C/QPP benefits 2. Period of relaxed eligibility in CPP (1987-1994).	Linear regression on labour force participation 1: -0.2171 (p=0.004) 2: 0.0149 (p=0.004)	The relaxed eligibility requirements in the CPP disability program did not have the expected sign in any of the regressions. The replacement rate was significantly associated with a decline in participation rates. However, these coefficient estimates were smaller and not statistically significant when the year specific effects were used instead of the linear time trend. Education level was not controlled for in the models and the health status control (regional mortality rate) was inadequate.	9
Maki (1993) [37]	45-65 year old Men	Time series ecological	~~1.Average~~1. Average monthly benefit payments in QPP/CPP as a ratio with wages 2. Difference between QPP and	Linear regression on labour market participation 1: -0.2 (p<0.001) 2 :0.102 (p<0.001)	The authors concluded that higher rates of benefits were significantly associated with lower employment. Health status and education level not controlled.	8

			CPP			

Studies investigating UK policy changes

Five studies of UK benefit policy change were reviewed (Table 3). Two of the studies used the British Household Panel Survey (BHPS) to assess the impact of the 1995 Incapacity to Work Act (IWA) [47-48]. This policy included a reduction in the level of benefits paid, particularly for older age groups, and a tightening of eligibility requirements. Disney et al (2003) did not detect a significant effect from the reforms on the employment of older men with poor health [48]. In contrast, Clasen et al (2006) concluded that the reforms made transitions from inactivity into employment more likely for 25-49 year old men and reduced the flow of older men (aged 50-64) from employment into long term sickness. Neither of these studies controlled for changes in wage levels and Clasen et al (2006) did not control for changes in health status.

Two studies used aggregate time series data to investigate the effect, on labour market participation, of changes in benefit levels and replacement rates between the early 1980s and the end of the 1990s [39] [40]. Benefit levels had been increasing up to the 1995 reform, which then decreased the benefits paid to older workers considerably. They find that replacement rates[39] and benefit levels[40] were negatively associated with labour force participation. However, neither study controlled for health status and labour market conditions. When separate age trends were included in the model in Bell and Smith's (2004) paper the overall effect was no longer significant[39]. Both studies found that that the negative effect of benefit levels on employment was larger for people with no qualifications. Using a model that did not include replacement rates, Faggio and Nickell (2005) found significant negative effects on labour market participation resulting from falls in regional wages in low level occupations in relation to national wage levels.

Another UK study analysed aggregate data from 1979 to 1984 and found that higher average replacement rates were associated with increasing numbers of people receiving benefits[38]. However, the model used did not control for health status or labour market conditions. Given that this period in the UK was one of rapidly rising national unemployment, this would need to be taken into consideration when interpreting the results. ~~In a~~A ~~seperate~~separate analysis ~~with~~ using cross sectional data they ~~show~~ indicated that unemployment was the dominant factor~~s~~ influencing disability benefit receipt, with higher unemployment levels in an area associated with higher disability benefit receipt.

Commented [SPC1]: Not sure you need the initials as you never refer to it again!

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Table 4 Studies from the UK on benefit changes

Author	Population	Study type	Description of policy under analysis	Result – regression coefficient (p-value)	Comments	VA
Disney,R, Emmerson,C Wakefield, M[48]	50-64 year olds	Interrupted times series with panel data	The introduction of the Incapacity to work Act in 1995 replacing invalidity benefits (IVB) with Incapacity Benefit (IB). IB was not available to people over state pension age, Eligibility conditions were tightened, those claiming IB no longer received an additional pension, based on earnings history, this meant that benefit level for older workers reduced by about 37%.	Fixed effects logistic regression of policy change on employment 0.10 (OR 1.11) (p=0.3)	The authors concluded that the weak results may reflect either a weak, or indeed no, relationship between the policy change and employment. Did not control for changes in wages	13
Clasen J;Davidson J;Granssmann H;Mauer A;[47]	men 25-64 year old	Interrupted times series with panel data	Introduction of Incapacity for Work Act (IWA) 1995, which tightened eligibility criteria and had effect of reducing benefit level for older workers.	Hazard model of transitions, model coefficients and exact p values not reported. -25-49 year olds Employment → long term sick: No significant effect Inactivity→ employment : Positive effect (p<0.1) Unemployment→ long term sick: No significant effect -50-64 year olds Employment→ long term sick: Negative effect (p <0.1) Inactivity→employment, No effect. Unemployment →Long term sick: Positive effect (p<0.1)	The authors concluded that the IWA made transitions from inactivity into employment more likely for 25-49 year olds. Amongst older workers the IWA decreased flow from employment into long term sick. However they also found IWA increased flow from unemployment into long term sickness, therefore the IWA didn't contribute to overall decrease in movements onto IB. Health status and wages were not controlled for in the analysis.	12
Faggio, G; Nickell, S[40]	Men age 25-54	Difference in differences study with ecological data	Weekly benefit rate (IB/IVB) paid to long term sick or disabled with contributory benefit entitlements between 1982 to and 1999.	Linear regression of the log of the rate of benefits and wages on non-employment All: 0.037 (p=0.009) Low education: 0.089 (p=<0.001)	The authors concluded the level of incapacity benefits was positively associated with male inactivity and a much bigger impact was observed for those without qualifications. They find much larger effects associated with low regional wages. Health status and labour market conditions not controlled.	10
Disney R;Webb S[38]	Men 18-69	Interrupted time series with ecological data And cross sectional analysis	Average replacement rate from invalidity benefits between1979 and -1984. The real value of benefits increased had been increasing during this timeover this period. .	Linear regression of replacement rate (benefits/wages) on probability of IVB receipt 0.292 (p<0.001) Also include a cross-sectional analysis of various factors on employment, but this does not include disability benefits as a independent variable	The authors concluded that the trend in IVB receipt was explained by the ageing of the workforce, changes in the replacement rate, in the health status of the workforce and in income and housing tenure. However the dominant variable was unemployment. They did not control for health status, education or labour market conditions in , in the time series analysis.	9
Brian Bell and James Smith;[39]	25-59 year old Men	Time series study with ecological data	Change in value of benefits between 1984 and 2001 resulting from increasing benefit level s prior to the introduction of the IWA in 1995 and a drop in benefit levels for some age groups following the IWA.	Regression of benefit level on labour force non-participation Elasticity=0.26 (p=0.002), however controlling for separate age trends reduced the coefficient and it became not significant.	The authors concluded that there was a sizable effect on male labour market participation of changes in benefit levels. This was particularly the case for the least educated men. Did not control for wages, health status or labour market conditions.	7

Studies investigating Swedish policy changes.

Two studies from ~~Sweden~~Sweden [41, 45] investigated changes in sickness and disability insurance policies. Hesselius and Persson (2007) used longitudinal (panel) data to investigate the effects on long-term sickness absence of a 1998 reform to the Swedish national sickness insurance scheme. This allowed for additional compensation from collective insurance schemes to be paid on top of national sickness insurance payments after 90 days of sickness absence. They found that for people on long term sickness absence, this reform was associated with an average increase in the duration of sickness absence of 4.7 days (2%) [41]. In the second study, Karlström et al (2008) used longitudinal data to investigate a 1997 change in the Swedish disability insurance scheme that abolished favourable treatment for people aged over 60. It required applicants to change occupation or residence to find a suitable job, to undertake a more stringent medical test and to engage in rehabilitation. The study did not detect any effect from the reform on the employment of older men (aged 60-64)[45]. They did find, however, that the reform was associated with a decrease in transition from unemployment insurance to disability insurance, a higher transition from employment to sickness insurance, a lower transition from sickness insurance to disability insurance and increased persistence in sickness insurance. In other words, the reform resulted in people shifting between benefits and did not appear to result in increased employment. These two studies were rated through the validity assessment as having the most robust data and analytical approaches.

Studies investigating policy changes in Norway.

One study from Norway was included in the review (Bowitz, 1997). This investigated the effect of changes in the replacement rate in the Norwegian disability insurance scheme between 1971 and 1991. Over this period, average replacement rates rose in the late 1970s and were unchanged or declined slightly during the 1980s[42]. The study found no significant relationship between the replacement rate and the numbers of people claiming disability benefits. It concluded that increasing unemployment was more important than increasing benefit levels in explaining rising entry rates into disability benefits during this time period.

Table 5. Studies on Swedish and Norwegian policy changes

Author	Population	Study type	Description of policy under analysis	Result – regression coefficient (p-value)	Comments	VA
SWEDEN						
Patrik Hesselius and Malin Persson[41]	All individuals with sickness absence spells of at least 91 days	Differences in Differences approach using panel data to compare blue collar workers with government workers who were not affected by policy change	A 1998 policy change in the national sickness insurance programme that allowed blue collar workers and municipal workers to claim an additional 10% of wages through compensation from collective agreements on top of the national insurance payments, after 90 days of sickness absence. Previously additional payments were deducted from national insurance.	Linear regression of policy change on duration of sickness absence. 4.66 days (p=0.001)	The authors concluded that this policy resulted in an increase in the duration of sickness absence, in this population by an average of 4.7 days. No corresponding effect was found prior to the 91st day or after the 360th day in sickness absence. Health, education or occupation not controlled in the analysis	14
Karlström,Anders ; Palme,Mårten; Svensson,Ingemar[45]	Male workers aged 60-64.	Differences in differences approach using panel data to compare effect of reforms on 60-64 year olds to 55-59 year olds	1997 policy change in the Swedish Disability Insurance scheme, which abolished favourable treatment for over 60 year olds including requirement to change occupation/ residence to find suitable job, a more stringent medical test and the requirement to engage n rehabilitation.	OLS regression of various transitions in and out of employment Employment→non-employment -0.0074 (p>0.1) All states→Disability Insurance -0.0104 (p >0.1) non-employment→ non-employment 0.01(p<0.05)	The authors concluded that it was not possible to detect any effect on employment from the reform. There did however appear to be an anticipation effect, in that there was an increased flow into disability insurance when the reform was announced. This was 2 years before the reform was actually implemented. They did however find that the reform was associated with a decrease in transition from unemployment insurance to disability insurance and , higher transition from employment to Sickness insurance and lower transition from Sickness insurance to Disability insurance as well as increased persistence in Sickness insurance. In other words the reform resulted in people shifting between benefit systems and not into the labour market. Level of disability, wages and benefit level were not controlled for in the analysis	14
NORWAY						
Bowitz E[42]	Men and women 16-66	A time series approach using ecological data	Changes in the replacement rate in the Norwegian disability insurance scheme between 1971-1991. Average replacement rates rose in the late 1970s and were unchanged or declined slightly during the 1980s	An error correction weighted linear regression analysing the effect of the replacement rate on the probability of entry into disability benefits. 0.17 (p=0.16)	The authors concluded that unemployment was important in explaining rising entry rates into disability benefit, but that there was less evidence for the effect of increases in the replacement rate. No control for health status or educational level.	9

Discussion

Our review sought to identify the evidence available from 5 OCED countries with highly developed social welfare systems, to determine the extent to which the generosity and eligibility requirements of disability benefit programmes affect labour market participation.

There was no clear evidence from these countries that changes in the eligibility requirements of disability benefits had a measurable impact on employment. Of the 5 studies that specifically addressed this issue, 1 from Canada found that relaxing eligibility was significantly associated with a decline in employment of older men[43], 2 papers from Canada found that some periods of relaxed eligibility were associated with a significant increase in employment[34, 46] and 2 papers from Canada[44] and Sweden[45] found no significant effect; importantly this included the Swedish paper that was rated as having the highest level of validity. Two papers from the UK assessed the impact of the Incapacity for Work Act which involved both a reduction in benefit levels and a tightening of assessment approach. These studies gave a mixed picture, one study demonstrated improved employment outcomes[47], whilst the other did not detect any effect[48]. Therefore we conclude that there is insufficient evidence to indicate whether changes in benefit eligibility requirements similar to those studied here will have an impact on the employment of people with disabilities and chronic Illness in well developed welfare states.

Of the 11 studies that investigated whether the generosity of disability benefits influenced labour market participation, 8 reported that benefit levels or benefit replacement rates had a significant negative association with measures of labour market participation [34-41]. Only one of these studies investigated the effect of benefit levels separately on the employment of women and this found no significant effect[46], the others only included men or were on mixed populations. These studies all have substantial validity issues, which we discuss in more detail below. The Swedish study that was assessed as being the most robust did however demonstrate a small but significant effect with an increase in benefit of up to 10% associated with a 2% increase in the duration of long term sickness [41]. Whilst several of the other studies in this review report much larger effects, there is some likelihood that the size and significance of these effects are attributable to other confounding factors and inappropriate statistical methods. We therefore conclude that whilst it is likely that at some level increased benefit generosity will reduce labour market participation, and that the majority of evidence reviewed here points in that direction, there is insufficient evidence of a high enough quality to determine the extent of that effect.

Limitations of the available evidence

All of these studies rely on "natural policy experiments", arising from governments changing disability benefit schemes over time, or when schemes were administered differently in different jurisdictions as in Canada. As with other observational studies, we need first to assess whether the size of the effects observed could be attributable to confounding factors or could have occurred by chance.

Conventional economic analysis of welfare systems has been criticised for oversimplifying the relationship between participation in the labour market and financial incentives [8]. There are numerous interrelated factors that could influence whether a person developing a health problem will subsequently remain in or return to employment. To determine whether the reported results are actually the result of changes in disability benefits, these other factors need to be taken into account either in the study design or in the analysis. Potential confounding factors in these studies would include changes in labour market conditions, disability and workplace legislation, rehabilitation interventions, as well as differences in individual characteristics such as educational level or health status. However many of the studies reviewed here had not fully taken this context into account. Four out of the 16 studies reviewed did not control for labour market conditions in their analysis [35, 39-40, 49]. Seven studies used aggregate (ecological) data in which individual characteristics cannot be adequately controlled for [34, 37-40, 42, 46]. Even those studies using individual data lacked sufficient controls for important individual confounders: all 16 studies were missing controls for one or more of the following variables; educational level, occupation, health status or wages.

It is recognised that these confounding issues can be partly overcome by using a "differences in differences" design and through using fixed effects models with longitudinal (panel) data[50]. Nine of the studies in this review [34-35, 40-41, 43-46, 49] used a difference in difference approach. Four of the studies reviewed used longitudinal (panel) data [41, 45, 47-48], and only 2 of used both [41, 45].

Fixed effects models will however only control for unobserved individual effects if these do not vary over time. Difference in difference designs, where one group has been affected by a policy change whilst another has not, will still be susceptible to an imbalance in characteristics between these two groups particularly if this results in different trends over time in the outcome.

The statistical techniques used by many of the studies in this review have been criticised widely in the econometric literature [51-53]. In particular where they have not taken into account serial and spatial correlation in the dependant variable [51-52]. Bertrand et al. (2004) demonstrate that this issue could result in difference-in-difference studies reporting a significant effect 45% of the time when in fact there is no effect[52]. Nine of the studies in this review, [34-39, 42-43] had not taken one or other of these issues into account and therefore will have under-estimated the standard error of the effect. The two studies from Sweden [41, 45] were rated as having the highest validity because they were the only studies to use longitudinal (panel) data, a difference in differences approach and an appropriate statistical technique. Given the threats to the validity of many of the studies in this review conclusions are necessarily limited and indicate that there is a lack of evidence of a high enough quality to indicate the extent to which these policies will increase labour market participation of people with chronic illness and disabilities.

Policy implications

There are various potential reasons why we found no clear evidence that changes in benefit eligibility requirements influenced employment. This may have resulted from the methodological issues discussed but it is also possible that there is actually no effect from these policies. One possible reason for a lack of effect, suggested by some papers in this review, is that changes in the eligibility structure for one benefit may result in movement into other benefit schemes rather than into the labour ~~market~~market [45, 47]. For example Karlstrom and Palme (2008) show that changes in the assessment requirements for disability benefits in Sweden resulted in increased persistence of people on sickness and unemployment benefits , but no increase in employment[45]. This indicates that changes to disability benefits need to be coordinated with developments in other welfare benefit schemes. The aim should be to increase employment rather just reducing the number of people on benefits.

Whilst we did not find sufficient evidence of a high enough quality to indicate the extent to which changes in benefit generosity affect employment, several studies indicated that wage levels and the level of unemployment, are potentially more important influences on the employment of people with disabilities. Three of the studies from the UK and Canada report that the low wages of jobs available was a more important predictor of decreased employment than the level of disability benefits [36, 39-40]. The level of unemployment at a regional and national level is also recognised as an important determinant of the numbers of people on disability benefits in two papers from the UK

and Norway [38, 42], with higher numbers on disability benefits associated with higher levels of unemployment.

The relationship between the level of wages and the structure of the disability benefit system in a country has important implications for work incentives and the differential effect of benefit levels on different socioeconomic groups. Norway, Denmark and Sweden are characterised by high minimum wages and generous disability benefits. High minimum wages in these countries may give strong incentives to work particularly for people with low social status, overriding the disincentive effects of high benefits. In Norway and Sweden benefit levels are dependent on previous earnings; this means that replacement rates (i.e the proportion of wages that would be replaced by benefits) are at a similar level for people on low wages as for those on higher wages. In countries with flat rate benefits such as the UK, Denmark and to a lesser extent Canada, the replacement rate will be higher for low wage earners than for higher earners. The disincentive effects of disability benefits are therefore likely to be greater for less skilled socioeconomic groups in those countries with flat rate benefits, particularly if wage levels for unskilled labour are also low. This may explain why two of the studies from the UK found that the negative effect of benefit levels on employment was larger for people with no qualifications[39-40].

In all five countries included in this review the employment rates of people with a chronic illness or disability decrease steeply with decreasing socioeconomic status [6-7]. The evidence presented here suggests that a combination of low wages for unskilled labour, high unemployment in disadvantaged areas and flat-rate disability benefits is likely to exacerbate this level of inequality. Interventions which may be influential would include those which increase the number of jobs that are accessible to people with disabilities and increase their wages either through subsidies or minimum wage legislation.

Before policy makers consider lowering and/or restricting access to disability benefits, on the assumption that it will increase employment amongst people with disabilities, they need to weigh up the potential benefits that may result from this policy, against its potential negative consequences. This review demonstrates that there is lack of high quality evidence of the extent to which reducing benefit levels will increase employment in countries with well developed welfare states. The level of gain from reducing benefits is largely unknown. The negative consequences have also not been assessed, but would potentially include increased poverty for people who already have health problems, possibly exacerbating health inequalities. Whilst changing benefit levels may affect the

employment of some claimants at the margins, the consequences of this, in terms of loss of income, affects all claimants. If the employment effects are found to be small and leave more vulnerable groups such as people with mental health problems on reduced benefits, the negative consequences may outweigh the gains made in increasing employment.

Future evaluations of these policies need to determine the extent to which they impact, not only on the employment of people with chronic illness and disabilities, but also on their income, social inclusion and health, as well as any differential impact across health conditions and social groups.

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Appendix 1. Major disability benefit changes in countries included in study

Country	Major Reforms of Disability Benefits
Canada	1973- Benefits in the QPP programme increased by $50(CAD).[49] 1984 -QPP introduced early retirement option.[49] 1987- CPP doubled the value of the flat-rate component of the benefit to a level equal to that paid by the QPP, relaxed the contributory eligibility rule and introduced early retirement option. [34, 46, 54] 1989 – CPP policy directive allowing non medical factors such as the regional unemployment rate to be taken into account when assessing claims[54] 1992- CPP allowed for retrospective claims for benefits to be determined some time after the date of onset of disability 1993- QPP changed their requirement for being unable to work from “any job” to “usual job” and relaxed contribution requirements 1995- A more stringent set of medical adjudication guidelines adopted in the CPP. 1995-A reversal of previous policy in the CPP allowing non medical factors such as the regional unemployment rate to be taken into account when assessing claims. 1995 –CPP Expands work test requirements to include 55-64 year olds. 1998-CPP changes contribution requirements and increases number of years of earnings used to calculate earnings related portion of benefit.
UK	1971 – Invalidity Pension and Invalidity Allowance (together known as Invalidity Benefits (IVB) contribution-based, income-replacement benefit introduced. 1975 – Introduction of Non-Contributory Invalidity Pension (NCIP) at lower rate than IVB (housewives ineligible) 1984 – NCIP replaced with Severe Disablement Allowance.

	1980- Invalidity Benefits linked to prices rather than being up-rated with earnings as they had been previously. 1986 – Income Support replaces Supplementary Benefit and includes extra cost Disability Premium[55] 1995- Incapacity for Work Act replaces IVB with Incapacity Benefit (IB). IB was not available to people over state pension age, eligibility conditions were tighter, those claiming IB no longer received an additional pension based on earnings history, as a result the benefit level for older workers reduced by about 37%[39] 1999- Contribution conditions modified, additional information required on ability to work, income from private pensions taken into account in assessing amount of benefit to be paid out. 2001 –Severe Disablement Allowance closed to new claims. 2008- Welfare Reform Act replaces IB with Employment Support Allowance for new claimants, this includes a more stringent work capability assessment and two-tier benefit with those deemed to be capable of work related activity will receive lower benefits than those judged unable to work conditional upon them undertaking work-related activity. [56]
Sweden	1987-Increase in sickness benefit replacement rate to 90% of earnings for all claims 1991-Reduction in sickness benefit level to 75% in the first three days. 1992 -Reduction in sickness benefit level to 80% after day 90. 1993- Reduction in sickness benefit level to 70% after the first year. Second half of the 1990s compensation rates increased again, offering 90% until the end of the first year and 80% thereafter. 1995-Tougher rules for sickness certification introduced 1997- Policy change in the disability insurance scheme, which abolished favourable treatment for over 60 year olds, introducing the requirement to change occupation or residence to find suitable job as well as a more stringent medical test and the requirement to engage n rehabilitation. 1998 - A policy change in the sickness insurance programme that allowed blue collar workers and municipal workers to claim an additional 10% of wages through compensation from collective agreements on top of the national insurance payments, after 90 days of sickness absence. 2003 Sickness and disability benefits merged: claimants aged under-30 receive 'activity compensation' only paid for a maximum of three years, over-30s receive 'sickness compensation' that can be permanent 2007- New guidelines introduced for granting sick leave certificates by GPs 2008- Reduction in sickness benefit to 80% of prior earnings for the first year, 75% for the second year payable for a maximum of 550 days. [5, 45, 57-59]
Norway	1988 the introduction of a medical Certificate system at 8 weeks of sickness absence.[60] 1993 Second medical reassessment introduced at 12 weeks 1970's-1980's-On average, replacement rates rose in the late 1970s and were unchanged or declined slightly during the 1980s.[28] 1991- Eligibility criteria tightened and level of benefit reduced [60-61] 1998- Minimum pension increased by 10%, age limit raised from 16 to 18 years old medical requirements sharpened for young disabled[62] 2000- Requirement for having gone through rehabilitation increased[62] 2004- Introduction of temporary disability benefit, and stricter evaluation of the functional capacity of the people on sick leave, including sanctions on GPs who do not comply with the new rules.
Denmark	Prior to 2003- Disability benefit level depended degree of disability, family status and age. 2003 - A new disability pension scheme consolidated this scheme into one benefit payable at a flat rate which is around half of the gross average wage. The partial benefit for partial

	disability was abolished altogether. The reform also included a change in the assessment criterion so that a person is now assessed as to whether they can support themselves through any work including a subsidised flex-job. 2005 - New medical certificates for sickness certification were introduced with a focus on the person's ability to function (certificates remain non-statutory)[63].

Appendix 2: **Databases searched**

1. British Humanities index BHI
2. MEDLINE
3. Scopus Business and Economics
4. Scopus natural sciences
5. Sociological Abstracts
6. International Bibliography of the Social Sciences
7. Database of Abstracts of Reviews of Effects
8. Cochrane database for systematic reviews
9. Social Sciences Index
10. Proquest dissertations and thesis
11. Econpapers
12. System for Information on Grey Literature in Europe Archive
13. Web of Science

Websites

1. International Labour Organisations
2. OECD
3. Department for work and Pensions
4. Her Majesties Revenue and Customs
5. Institute for Fiscal Studies
6. National Institute for Economic and Social Research.
7. The Institute for Employment Research.
8. Centre for Economic Policy Research
9. Danish National Centre for Social Research.
10. Stockholm University's Department of Economics Working papers.
11. Sweden's National Institute of Economic Research.
12. The Institute for Labour Market Policy Evaluation

Appendix 3.

Validity Assessment

Criteria	Rationale	Score
Unit of analysis	First, whether the unit of analysis was aggregate (ecological), individual or repeated measures on the same individuals (panel). Panel data was seen as being the most robust as it allows for unmeasured confounding factors to be accounted for where these do not vary within individuals over time. Ecological studies were seen at the least robust as ecological bias can occur where aggregate data are used to make inferences about individuals.[64] Second, in terms of the comparison approach used in the analysis.	**3- Longitudinal (panel) data** **2-Individual data** **1-Ecological (aggregate data)**
Comparison approach	Studies either compared cross sectional differences in disability benefits, changes over time or a combination of both using a difference in differences approach. Cross sectional comparisons will be particularly susceptible to unmeasured sources of confounding. Studies that look at changes in the same group over time will overcome this to a certain extent; however the results will be at risk of being influenced by other secular trends. The most robust approach will be where a policy has changed over time for one group and this is compared with another group that is unaffected by the change (a difference in differences approach).	**3-Difference in Differences** **2-Interupted time series** **3-Cross sectional**
Selection and response bias	Assessment of the level of selection and response bias, based on information reported on data sources. No studies reported response rates or formally assessed response or selection bias. Most studies used recognised national surveys.	**3- Random sample/ Nationally recognised survey** **2-Non random sample but evidence that it is comparable** **1- Non random sample from administrative system of programs without universal coverage.**

Confounding	Whether potential confounders were adequately adjusted for in the analysis (Age, Sex, Health status, Labour market conditions, wage, education or occupation.	**3- All major confounders included in analysis** **2-Missing <3 confounders** **1-missing >2 confounders**
Analysis	The likelihood of the analysis resulting in biased estimates was assessed. This included looking at the sample size and whether an appropriate statistical technique had been used. In particular several studies had not adequately adjusted for the spatial clustering and serial correlation in the data. Often multiple model specifications are presented each with different sets of covariates without a systematic approach to identify the most appropriate covariates to include in the final model [65].	**3- large sample size and an appropriate statistical technique was used** **2-Either an inappropriate statistical technique was used or the sample size was small.** **3.-Both an inappropriate statistical technique was used and the sample was small.**

Appendix 4. Summary of search stategy

Policy	(change/difference/reform/eligib*/uneligib*/qualify*/entitl*/generosity/screen*/ condition* AND /benefit*/insurance/income replacement/pension*/ compensation/welfare/social security),
Population	(sickness/disab*/chronic/injur*/accident/illness/)
Outcome	Labour/labor /work/force/involve*/participat*/unemployment/employment).

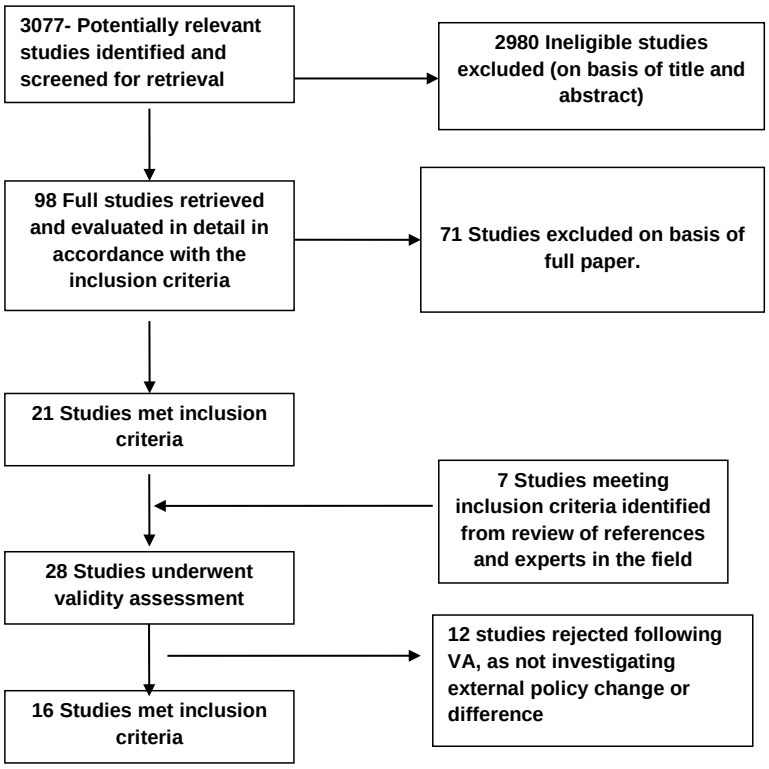

Figure 1 Flow chart for searches and study selection

A full search strategy is available from the author's on request

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