SSM -Population Health 2 (2016) 580–586

Contents lists available at ScienceDirect

SSM -Population Health

journal homepage: www.elsevier.com/locate/ssmph

Article

The impact of self-reported health and register-based prescription medicine purchases on re-employment chances: A prospective study

Annemette Coop Svane-Petersen [a,b], Sofie Dencker-Larsen [a,b,*]

[a] SFI – The Danish National Centre for Social Research, Herluf Trolles Gade 11, DK-1052 Copenhagen K, Denmark
[b] Department of Sociology, University of Copenhagen, Øster Farimagsgade 5, Building 16, DK-1014 Copenhagen K, Denmark

ARTICLE INFO

Article history:
Received 14 March 2016
Received in revised form
11 August 2016
Accepted 12 August 2016

Keywords:
Self-reported health
Prescription medicine purchases
Somatic illnesses
Mental illnesses
Re-employment
Prospective study
Register data

ABSTRACT

In this paper, we investigate the influence of self-reported health and register-based prescription medicine purchases on re-employment chances, and whether these health indicators measure similar aspects of health in this analysis. Data came from a 2006 Danish unemployment survey among a random sample of unemployed individuals enriched with register data (2006–2008, $N=1806$). The survey participants all received unemployment benefits from the welfare system and had been unemployed for more than 20 weeks at the time of the interview in 2006. We combined these data with longitudinal register data on individual prescription medicine purchases for somatic illnesses and prescription medicine purchases for mental illnesses, information on re-employment and various socio-demographic variables. We conducted binary logistic regression analyses to investigate the impact of self-reported health and prescription medicine purchases measured in 2006 on re-employment chances in 2007 and 2008. Our analyses show that unemployed workers with poor self-reported health and workers who had prescription medicine purchases for mental illnesses were less likely to be re-employed in 2007 and 2008. Furthermore, the impact of both prescription medicine purchases for somatic illnesses and for mental illnesses increased when adding self-reported health to the model although prescription purchases for somatic illnesses became statistically insignificant. The impact of prescription medicine purchases for somatic illnesses was mediated by self-reported health, whilst prescription medicine purchases for mental illnesses was only partly mediated. Finally, SRH seemed a much stronger prediction than prescription medicines. From these results, we propose, when possible, the inclusion of both an indicator of self-reported health and an indicator of mental health in studies on re-employment.

1. Introduction

Several studies have explored the influence of poor health on re-employment chances, and the majority of research finds poor health to be a negative determinant of re-employment (Carlier, Schuring, van Lenthe, & Burdorf, 2014; Claussen, Bjørndal, & Hjort, 1993; Claussen, 1999; Patterson, 1997; Schuring, Burdorf, Kunst, & Mackenbach, 2007; Schuring, Robroek, Otten, Arts, & Burdorf, 2013; Rosholm & Andersen, 2010; Van de Mheen, Stronks, Schrijvers, & Mackenbach, 1999). Throughout the literature on health determinants of re-employment, the majority of studies apply indicators of SRH of overall health (Carlier et al., 2014; Schuring et al., 2007, 2013; Van de Mheen et al., 1999) and some apply measures of certain aspects of health, such as mental health only (Claussen, 1993; Claussen et al., 1993; Kessler, Turner, & House, 1989; Patterson, 1997; Warr & Jackson, 1985). One argument for the usefulness of self-reports is that mortality studies have shown these indicators to have high predictive power for mortality and to give a complete picture of overall health even after adjustment for objective parameters of physical and mental symptoms (DeSalvo, Bloser, Reynolds, He, & Muntner, 2006; Idler & Benyamini, 1997). Although self-reports are highly useful, they may not capture all aspects of health. Therefore, a few studies on health determinants of labor market outcomes have introduced third-party indicators, such as medical records, which, compared with self-reports, find a lower share of health problems among individuals outside the labor force (Davies & Ware, 1981).

More infrequent are re-employment studies using third-party-evaluated indicators of individual health, such as medical diagnoses determined by doctor examination (Claussen, 1993; Claussen, 1999) or prescription medicines for mental illnesses prescribed by a general practitioner (Rosholm & Andersen, 2010). The scarcity of this research may be because third-party indicators of health require costly and time-consuming involvement of general practitioners, psychiatrists or psychologists to evaluate patient

* Corresponding author at: SFI – The Danish National Centre for Social Research, Herluf Trollesgade 11, DK-1052 Copenhagen K, Denmark.
E-mail address: sdl@sfi.dk (S. Dencker-Larsen).

http://dx.doi.org/10.1016/j.ssmph.2016.08.007

health or that individual register data containing this information are not accessible. Although this type of indicators is rarely used in re-employment studies, the few findings underline their relevance in re-employment studies. One study finds that medical diagnosis captures selection on health into re-employment better than psychometric tests (Claussen et al., 1993). Another study concludes that medicine purchases for mental illnesses significantly diminish re-employment chances (Rosholm & Andersen, 2010).

By combining two different types of health indicators, one based on self-reports, the other based on register data, in one dataset, our aim is that findings from our study will contribute to discussions within both the literature on the impact of health on re-employment chances and within the literature on the validity of different types of health indicators. To our knowledge, our study is the first to combine an indicator of SRH from survey data with prescription medicine purchases for somatic and mental illnesses taken from extensive Danish register data and added to the same individuals. These unique data allow our analysis of health determinants of re-employment to capture overall, somatic and mental aspects of health separately. In our study we investigate two research questions: 1) whether self-reported health (SRH) and register-based prescription medicine purchases (prescription medicine purchases) affect re-employment chances, and 2) whether SRH and prescription medicine purchases for somatic illnesses and prescription medicine purchases for mental illnesses measure different aspects of health on re-employment chances.

1.1. Institutional setting

The Danish health care system is universal, tax based, government run, and free of charge for all (Gupta, Kleinjans, & Larsen, 2015; Torfing, 1999; Vallgårda, Krasnik, & Vrangbæk, 2001). Among other services, free health care includes consults with general practitioners, who are responsible for writing the prescriptions that are relevant in this study. Furthermore, prescription medicine purchases are partially reimbursed. If a person has yearly medical expenses of more than the equivalent of 148 USD, then 50–80% of the amount is reimbursed, and if a person is unemployed, he or she can apply for further reimbursement (Danish Ministry of Health, 2012). Therefore, individual health expenses are minor compared with, for example, those in the United States (Gupta et al., 2015). That the majority of Danes are able to purchase prescription medicine suggests that information on medicine purchases from Danish register data are useful indicators of health.

The Danish unemployment benefits system is similar to the Danish health care system. The unemployment benefits system is universal, tax based, and government run. Unemployed workers may receive unemployment benefits from the welfare system for an unlimited amount of time (Graversen & Jensen, 2010), however, they must meet certain criteria in order to receive the benefits: First, unemployed workers must attend mandatory active labor market programmes and meetings with a case worker at the local municipal job center. Second, they must be unable to financially support themselves in other ways; they must not be receiving unemployment insurance, have a fortune exceeding 10,000 DKK (appr. 1686 USD) or have possessions such as a house or a car equivalent to this amount. If an unemployment benefits applicant is married, the spouse must not earn more than twice the monthly benefits amount and cannot have possessions worth more than 20,000 DKK (Danish Ministry of Labor, 2006). The eligibility criteria for unemployment benefits are unlikely to have implications for this study's representativeness of sociodemographic characteristics such as age and gender. However, those who have fortunes, those married to a working spouse and those who have a private unemployment insurance may be underrepresented.

2. Data and methods

2.1. Design and study population

The data in this study come from a Danish survey of welfare claimants combined with extensive Danish administrative data on re-employment, prescription medicine purchases for somatic illnesses, prescription medicine purchases for mental illnesses, and the socio-demographic characteristics of age, sex, marital status, having children < 17 years old, country of origin, and years of paid work since 1980. The survey was conducted by SFI – The Danish National Centre for Social Research. Data were gathered by telephone (CATI) in May and June of 2006 from a random sample of unemployed welfare claimants who had all received unemployment benefits for a minimum of 20 weeks at the time of the interview (Bach & Petersen, 2007; Bach, 2009; Bach, 2012). Participation in the survey was voluntary.

The survey response rate was 45.5%, and a total of 1947 persons participated. Attrition was statistically significant and higher among immigrants from non-Western countries, persons living in the metropolitan area and men. For further details on the survey and attrition, see Bach and Petersen (2007). We matched the survey data with extensive Danish administrative data on an individual level from the years 2006–2008. Data were provided in anonymized form by Statistics Denmark and merged from several administrative registers by using civil registration numbers. Because these register data cover all Danish citizens residing in Denmark, there was no loss to follow up other than those due to death or emigration. In our data, we include the 1805 unemployed respondents for whom there is sufficient information from both the questionnaires and the register data.

2.2. Health indicators

SRH was measured at baseline in May and June 2006 with a single-item survey question regarding global SRH asking respondents to rate their overall health on a five-point scale ranging from “very good” (1), “good” (2) and “fair” (3) to “poor” (4) or “very poor” (5) (author's translation). Furthermore, we use a dichotomous indicator of SRH, thereby separating workers who are in good health (those who rated their health as “very good”, “good” or “fair”) from workers who are in poor health (those who rated their health “poor” or “very poor”). The distribution in the sample is reported in Table 1.

As register-based indicators of health we use two indicators, *prescription medicine purchases for somatic illnesses* and *prescription medicine purchases for mental illnesses*. We use indicators for both prescription medicine purchases for somatic and mental illnesses because previous studies suggest that they predict re-employment differently (Claussen et al., 1993; Claussen, 1999). These indicators include individual medicine purchases at baseline from the first six months of 2006 because all the respondents were unemployed during this period. Each indicator is a dummy variable that takes the value 1 if an individual makes a purchase of the relevant medicine within the first 6 months of 2006 and takes the value 0 otherwise.

The two prescription medicine indicators are measured by use of information on individual purchases of medicine from the Danish Register of Medicinal Product Statistics. Denmark has three large, continuously-updated medical registers: 1) hospital records, 2) the Social Security Register, and 3) the Prescription Drug Register. Hospital records measure only severe health issues, and the Social Security Register contains no information about diagnosis. We focus on the Prescription Drug Register because it a) provides a proxy for the outcome of an evaluation by a health professional (the prescription), b) gives indication of the type of illness (the

Table 1
Socio-demographic characteristics of the sample, $N=1805$.

Control variable	Mean (SD)
Female	0.58 (0.49)
Age	36.47 (11.18)
Married	0.28 (0.45)
Children below the age of 17	0.48 (0.50)
Work experience since 1980	**Percent**
1–4 years	78
5–9 years	13
10–14 years	6
15+ years	3
Country of origin	
Denmark	71
Immigrants from Western countries	7
Immigrants from non-Western countries	22
Independent variable	
SRH	
Very good	20
Good	24
Fair	25
Poor	21
Very poor	11
Prescription medicine for somatic illnesses[a]	16
Cardiovascular diseases	10
Chronic lung diseases	7
Type 2 diabetes	4
Prescription medicine for mental illnesses[a]	22
Antipsychotics	4
Anxiolytics and sedatives	10
Antidepressants	14
Dependent variable	
Re-employment in 2007 and 2008	
Not re-employed	74
Re-employed	26
Total	100

[a] The percentages do not add up because one individual may purchase prescription medicines for several types of illnesses simultaneously.

drug type) and 3) contains both severe and less severe diagnoses.

We include medicines prescribed for somatic illnesses that are among the most widespread in Denmark (Statens Serum Institut, 2013): cardiovascular diseases, type 2 diabetes, chronic lung diseases and mental illnesses. For mental illnesses, we include antipsychotics, antidepressants, anxiolytics, and hypnotics and sedatives. These drugs are strongly associated with mental health and act on the nervous system by having either a calming (psycholeptic drugs) or an arousing (psychoanaleptic drugs) effect on the patient's mood (Rosholm & Andersen, 2010). We classify the types of prescription medicines using the World Health Organization's Anatomical Therapeutic Chemical Classification System with Defined Daily Doses (ATC/DDD) (WHO Collaborating Centre for Drug Statistics Methodology, 2015; World Health Organization, 2007). We exclude three types of illnesses although these are also considered to be widespread: dementia; osteoporosis and diseases in the musculoskeletal system; and preventable cancer. Dementia is excluded because it mostly appears among the elderly outside the workforce. Osteoporosis and diseases in the musculoskeletal system are excluded because medicines for these diseases are likely to be over the counter purchases. Finally, we exclude medicines for preventable cancer because precise information about this type of medicine purchase is not available in the Danish Register of Medicinal Product Statistics due to hospitals administering most of these medicines to patients (as opposed to prescriptions by general practitioners).

Ideally, we could include diagnostic information from general practitioners as an indicator of health. This data is not available in the health registers, however (Erlangsen & Fedyszyn, 2015). We expect the related *prescription medicine purchases* to be reliable indicators of poor health because a patient must consult with a general practitioner to receive a prescription and thus be able to obtain medicines for the illnesses selected in our study. We cannot link exact types of medicine directly to specific diagnoses for two reasons: 1) substitution, e.g., antidepressants being used to treat anxiety disorders, and 2) complementarity, such as antidepressants and antipsychotics being used at the same time to treat severe depression with psychotic features (Danish Medicines Agency, 2004; Damsbo, Holm, & Stage, 2015; Rosholm, Gram, Damsbo, & Hallas, 1995). We can, however, indeed rely on the overall categories of prescription medicine purchases for somatic illnesses as an indicator of somatic illness and prescription medicine purchases for mental illnesses as an indicator of mental illness.

Table 1 displays the distributions of the two variables for prescription medicine purchases in the sample. 16% purchased prescription medicine for the selected somatic illnesses; most of these purchases were for cardiovascular diseases (10%), followed by chronic lung diseases (7%) and type 2 diabetes (4%). 22% of the sample purchased one or more types of prescription medicine for mental illnesses; most purchases were for anti-depressants (14%), followed by anxiolytics and sedatives (10%) and finally antipsychotics (4%). The overlap between purchases of prescription medicine for mental illnesses and for somatic illnesses is 33% (results available upon request). Furthermore, Table 2 shows the percentage of individuals who purchased prescription medicine for somatic or mental illnesses within each category of SRH. A clear pattern in the raw percentages emerges: individuals who report their health to be good purchase fewer prescription medicines of either type (6%) than those who report their health to be poor (34%).

2.3. Re-employment

We measure re-employment as a dummy variable that takes the value 1, re-employment, if a person received no type of welfare benefit, such as unemployment benefits, sick leave benefits, disability pension, early retirement, or maternity leave benefits, throughout 70% of the years 2007 and/or 2008. The dummy takes the value 0 if a person received any type of welfare benefit for more than 30% of either 2007 or 2008. This indicator was previously used by Bach (2012), and, similarly, several labor market studies use the absence of receiving welfare benefits as indicators of re-employment (Høgelund, Holm, & McIntosh, 2010; Høgelund, Holm, & Falgaard Eplov, 2012; Graversen & Van Ours, 2008). Table 1 displays the percentage share of re-employed individuals in the sample in 2007/2008. Furthermore, we exploit the

Table 2
Prescription medicine purchases within each category of SRH, percent.

SRH	Prescription medicine for somatic illnesses	Prescription medicine for mental illnesses
Very good ($N=353$)	6	7
Good ($N=431$)	11	14
Fair ($N=443$)	18	26
Poor ($N=384$)	21	33
Very poor ($N=194$)	34	34

longitudinal structure of our data to construct ten separate dummies measuring re-employment separately for each of the ten yearly quarters from the 3rd quarter of 2006 to the 4th quarter of 2008. For each quarter, the dummies take the value 1 if an individual received no welfare benefits throughout the entire quarter and 0 otherwise. The quarterly percentage share of re-employed individuals in the sample shows an upward tendency from the 3rd quarter of 2006 to the 2nd quarter of 2008 followed by a slight decline in the 3rd and 4th quarters of 2008 (results available on request).

2.4. Control variables

We include the following control variables: age (mean 36.5 years), sex (male 42%, female 58%), marital status (28% married or cohabiting with a partner), have children <17 years old (48%), country of origin (22% were immigrants from non-Western countries, 7% from Western countries and 71% from Denmark), years of paid work since 1980 (78% had less than five years of work experience). All the variables are defined by Statistics Denmark. Distributions in the sample are displayed in Table 1. We include age and sex because previous research has shown that health differs across both (Andersen, 2009; Lindeboom & Van Doorslaer, 2004). Similarly, marital status, having children below the age of 17 and country of origin have been shown to affect re-employment chances in previous studies (Carlier et al., 2014; Schuring et al., 2007), whilst varying degrees of labor market experience, also, can impact re-employment chances (Rosholm & Andersen, 2010).

2.5. Analytical procedure

To study the impact of SRH and prescription medicine purchases on the possibility of re-employment, adjusted for individual socio-demographic characteristics, we performed binary logistic regression analysis. The first step in the analysis was to establish the association between SRH and re-employment chances introduced in Model 1, which included only SRH on a five-point scale and the various controls. Second, we introduced Model 2, which included a binary version of SRH separating workers in poor health from workers in good health. Third, we included the two indicators of prescription medicine purchases in Model 3. Fourth, to compare the impact of SRH and prescription medicine purchases on the likelihood of re-employment, we introduced the full model, Model 4, which included both the binary version of SRH and the variables for prescription medicine purchases for somatic and mental illnesses. Additionally, we used the KHB method for non-linear probability models (Karlson, Holm, & Breen, 2012) to identify the unbiased change in the odds of prescription medicine purchases when SRH was added to Model 4.

A potential limitation of our analysis is the restriction on the measurement of health to only one point in time. Therefore, our study's inability to register changes in health between baseline and follow up could potentially lead to biased results because workers in poor health could have improved their health status over time and workers in good health could have developed undetected health problems. Therefore, in an additional analysis, we determined the robustness of the health indicators as predictors of re-employment over time. Exploiting our longitudinal data on re-employment, we analyzed the health impact on re-employment chances separately for each of the in total ten yearly quarters from the 3rd quarter of 2006 to the 4th quarter of 2008.

All the statistical models were conducted with STATA 13 (StataCorp. 2013. *Stata Statistical Software: Release 13*. College Station, Texas, United States of America: StataCorp LP) based on the same number of individuals.

Table 3
SRH determinants of re-employment among unemployed workers ($N=1805$), binary logistic regression analysis.

Model 1	Re-employment OR (95% CI)[a]
SRH (ref. very good health)	
Good health	0.8 (0.60–1.07)
Fair	**0.47 (0.34–0.65)**
Poor health	**0.15 (0.10–0.23)**
Very poor health	**0.13 (0.08–0.24)**

A significant association >0.05 is marked by bold font.

[a] Adjusted for marital status, sex, age, country of origin, children below the age of 17 and work experience since 1980.

3. Results

3.1. Association between health and re-employment

Table 3 shows that unemployed workers in poor SRH were less likely to be re-employed. Unemployed workers with poor or very poor health were associated with significantly lower likelihood of re-employment ($OR_{Poor\ health}$ 0.15, 95% CI 0.10–.023; $OR_{Very\ poor\ health}$ 0.13, 95% CI 0.08–0.24) than those with fair (OR_{fair} 0.47, 95% CI 0.34–0.65) or good (OR_{good} 0.8, CI 95% 0.60–1.07) health. The impact of both prescription medicine purchases for somatic illnesses and for mental illnesses increased when adding self-reported health to the model, although prescription purchases for somatic illnesses became statistically insignificant, Furthermore, there was no statistically significant difference in the impact on re-employment between workers in good health and workers with very good health (the reference category). This result supports including SRH as a dichotomous measure in the combined analysis with the two dichotomous prescription medicine purchases variables by corresponding to the results in Table 6 in which SRH is dichotomous; workers in poor health had lower re-employment chances ($OR_{poor\ health}$ 0.21, 95% CI 0.15–0.29) than workers in good health.

Prescription medicine purchases for both somatic ($OR_{somatic}$ 0.64, 95% CI 0.45–0.92) and mental (OR_{mental} 0.46, 95% CI 0.34–0.63) illnesses had a negative influence on the likelihood of becoming re-employed. After adjusting for SRH, however, the influence of prescription medicine purchases for somatic illnesses became insignificant. Furthermore, Table 4 shows that poor SRH had a larger negative impact (OR 0.23, 95% CI 0.17–0.32) on re-employment chances than prescription medicine purchases for mental illnesses (OR 0.57, 95% CI 0.41–0.79). The results in Table 4 were confirmed by results from the robustness checks using the

Table 4
Influence of SRH and prescription medicine purchases on the likelihood of re-employment among unemployed workers ($N=1805$), binary logistic regression analyses.

	Re-employment OR (95% CI)[a,b]	Re-employment OR (95% CI)[c,b]	Re-employment OR (95% CI)[d,b]
SRH (poor)	**0.21 (0.15–0.29)**	–	**0.23 (0.17–0.32)**
Prescription medicine purchases for somatic illnesses	–	**0.64 (0.45–0.92)**	0.73 (0.50–1.50)
Prescription medicine purchases for mental illnesses	–	**0.46 (0.34–0.63)**	**0.57 (0.41–0.79)**

A significant association >0.05 is marked by bold font.

[a] Health variable in model is SRH measured dichotomously.

[b] Adjusted for marital status, sex, age, country of origin, children below the age of 17 and work experience since 1980.

[c] Health variables in model are prescription medicine purchases.

[d] Health variables in model are prescription medicine purchases and SRH measured dichotomously.

KHB method, which also showed that the odds ratio of prescription medicine purchases for mental illnesses decreased after adjusting for SRH (available upon request).

The results of the additional binary regression analysis of health on re-employment by quarters from the 3rd quarter of 2006 to the 4th quarter of 2008 (available upon request) confirmed the robustness of the core results; both SRH and prescription medicine purchases for mental illnesses significantly lowered the likelihood of re-employment with SRH having the largest negative impact. The maximum variation in odds ratios between quarters is only 0.16 for SRH (between OR=0.14 in the 3rd quarter of 2006 and OR=0.29 in the 4th quarter of 2008) and 0.16 for prescription medicine for mental illnesses (between OR=0.45 in the 3rd quarter of 2006 and OR=0.59 in the 4th quarter of 2007).

Regarding the control variables in Model 4, health had less influence on reemployment (OR=2.89) among workers with more than 15 years of work experience than among those with less experience; we found the same result for those with children below the age of 17 (OR=1.33). In contrast, health had a larger influence on re-employment chances for women (OR=0.69) than for men (results available upon request).

4. Discussion and conclusion

Investigating our first research question, whether self-reported health (SRH) and register-based prescription medicine purchases (prescription medicine purchases) affect re-employment chances, we found that unemployed workers in poor SRH and unemployed workers who had purchased prescription medicines for mental illnesses were less likely to be re-employed. We also found that the impact of both prescription medicine purchases for somatic illnesses and for mental illnesses increased when adding self-reported health to the model. Prescription medicine purchases for somatic illnesses had no statistically significant independent impact on re-employment in the combined analysis with SRH and prescription medicine purchases for mental illnesses. Therefore, in conclusion to our second research question, whether SRH and prescription medicine purchases measure different aspects of health on re-employment chances, we conclude that in this analysis on re-employment chances, SRH was a better indicator of somatic health than prescription medicine purchases for somatic illnesses. Taken together, our results also showed that SRH and prescription medicine purchases for mental illnesses each captured unique aspects of health in determining re-employment chances. SRH measured mainly physical health, and prescription medicine purchases for mental illnesses addressed a separate mental health aspect of re-employment chances. Thus, our study suggests the relevance of including both SRH and an indicator of mental health in future analyses of re-employment chances.

The combination of survey data and register data on prescription medicine purchases and employment status at the individual level allowed for the use of both SRH and prescription medicine purchases for somatic illnesses and prescription medicine purchases for mental illnesses in our analyses. Including both self-reported and register-based indicators of health in the same model enables further exploration of the negative influence of poor health on re-employment chances. In contrast to other re-employment studies (Claussen et al., 1993; Carlier et al., 2014; Kessler et al., 1989; Van de Mheen et al., 1999), our register data providing longitudinal information on re-employment left no loss to follow up. The low response rate at baseline, however, may have had implications for our findings. Survey completion was 45.5% at baseline, which is lower than those of other re-employment studies with completion percentages of approximately 60–80% (Carlier et al., 2014; Claussen et al., 1993; Kessler et al., 1989; Van de Mheen et al., 1999). As the interviewers could only interview in Danish, the lower response rate for immigrants from non-Western countries (36%) may have been caused by difficulties with the Danish language. It may also explain why we found no differences in the influence of health on the likelihood of re-employment among different ethnic backgrounds.

In addition, the response rate was lower for men (43%). A few studies have shown gender differences in the impact of health on re-employment. Claussen (1999) showed a negative correlation between diagnoses for somatic illnesses and re-employment which was statistically significant for men only. Schuring et al. (2007) and Rosholm and Andersen (2010) found that women in poor health had less chance of entering paid employment than men in poor health. In line with this, in our study, poor health among women had a larger negative influence on re-employment chances than among men. Although the literature on the mediating role of gender is sparse and results differ, the findings underline the importance of gender in re-employment studies and suggest that the low response rate for males in our study may have affected our results. Furthermore, there may be a bias of poor health in the sampled respondents, but the data does not enable analyzing whether the results are affected by this, and, if so, whether the results are skewed towards lower-bound or upper-bound estimates.

Our analyses showed robustness over time. The data provided a restriction on the measurement of health to only one point in time; this makes our study unable to measure changes in health between baseline and follow up, which could potentially have led to biased results because workers in poor health could have improved their health status over time, and workers in good health could have developed undetected health problems. Our results, however, showed only minor changes in the influence of health on re-employment between the quarters ranging from the 3rd quarter of 2006 to the 4th quarter of 2008, thus indicating robustness of the results over time and emphasizing the ability of both SRH and prescription medicine purchases for mental illnesses to predict re-employment chances over a period of 2½ years. Our results also follow the majority of findings on the negative influence of poor health on re-employment in terms of both overall SRH (Carlier et al., 2014; Schuring et al., 2007; Schuring et al., 2013; Van de Mheen et al., 1999) and mental health (Claussen, 1993; Claussen et al., 1993; Claussen, 1999; Kessler et al., 1989; Patterson, 1997; Warr & Jackson, 1985).

In our study we chose to use two different types of health indicators: self-reported and register-based. Our analyses showed that poor SRH had a larger negative impact on re-employment chances than prescription medicine purchases for mental illnesses. This finding is in agreement with the body of research on mortality predictions by SRH. Supporting the assumption that the widely used SRH indicator is a robust measure of health is a meta-analytic review of 22 longitudinal mortality studies concluding that the negative relationship between poor SRH and mortality was robust even after controlling for co-morbid illness, functional status, cognitive status, and depression (Paul & Moser, 2009). Thus, our results followed the literature emphasizing the robustness of SRH and its use as a predictor of re-employment.

To our knowledge, prior to our study only a single study has investigated the influence of medicine for mental illnesses on re-employment chances. This study found medicine for mental illness to diminish re-employment chances (Rosholm & Andersen, 2010), which our results support. Additionally, we found only two studies (Claussen et al., 1993; Claussen, 1999) that combine self-reported (mental) health with third-party reported health indicators, and their results correspond to our analysis in concluding that both psychiatric diagnosis and SRH predict re-employment at a

two-year follow-up. Due to the rarity of studies using medicine purchases as indicators of health, however, a limitation of our study is that the validity and reliability of prescription medicine purchases has not been subject to the same degree of assessments as those of SRH. Prescription medicine purchases may be subject to lower inter-rater reliability of clinical judgments because previous research has found general practitioners to have different propensities to prescribe medicine (Phelps, 2000).

Furthermore, prescription medicine purchases as an indicator of illness potentially underestimates illness because these variables only register individuals who fulfill three criteria: 1) they choose to see a general practitioner, 2) they are assessed to need a prescription by their general practitioner, and 3) they purchase the prescribed medicine at the pharmacy. The restriction of mental health to prescription medicine purchases for mental illnesses in our analysis provides empirical background for conducting futures studies, which we encourage include, alongside SRH and third-party health indicators (such as prescription medicine purchases), psychometric indicators of psychological distress, such as the General Health Questionnaire (GHQ) (Claussen, 1993; Claussen et al., 1993; Kessler et al., 1989; Warr & Jackson, 1985; Patterson, 1997). Self-reported mental health indicators like the GHQ can, in contrast to prescription medicine purchases and similar health indicators, also measure untreated psychological distress which may also affect re-employment chances.

Research investigating the reasons of the impact of health on re-employment is sparse, and uncovering explanations underlying this empirical relationship is beyond the empirical scope of our study. We will, however, briefly discuss possible explanations suggested by the literature in the field because this knowledge enables interpreting our findings and can assist in strengthening re-employment programs for unemployed workers in poor health. Within the literature, the possible explanations for why health has an impact on re-employment chances focus on both the demand and supply sides. First, the gap between the work capability of unemployed individuals in poor health and employers' demands likely lowers re-employment chances. Several studies have shown a reluctance of employers to hire workers in poor health (Black, 2008; Rosenstock, Tinggaard, Holt, & Jensen, 2004), which could be related to employers being required to pay salaries to workers on sick leave for a limited amount of time, whilst the employer is being reimbursed for this cost only up until a ceiling (estimated to only cover two thirds of a production worker's salary) (Høgelund et al., 2012). Employer reluctance to hire workers in poor health could also be attributed to potential concern among colleagues especially when hiring individuals with mental illnesses (Thomsen, Holt, Jensen, & Thuesen, 2011).

Second, studies have found that poor health influences job-search cognitions and coping resources among unemployed individuals, which results in less active job-search behavior and in lowered re-employment chances (Carlier et al., 2014). This may be particularly relevant for individuals in poor mental health because this group is characterized by feelings of low self-esteem, apathy, powerlessness, and hopelessness (Taris, Bok, & Caljé, 1998), among others, which research has shown affect job-search behavior negatively (Taris, 2002; Skärlund, Åhs, & Westerling, 2012). These explanations are the likely background of one of the findings in our study: that both mental health and somatic health are important determinants of re-employment, suggesting that programs to increase labor market participation should address both.

In conclusion, our study finds that both poor SRH and prescription medicine purchases for mental illnesses influence re-employment chances negatively over a 2½-year period, although SRH seems a much stronger prediction than prescription medicines. Despite the impact increasing prescription medicine purchases for somatic illnesses had no statistically significant independent explanatory power. This suggests that SRH measures mainly somatic health, and that it is a stronger indicator of health in re-employment studies than prescription medicine purchases. Additionally, it suggests the fruitfulness of including not only SRH, but also a separate indicator for mental health in re-employment studies. We propose more studies on the importance of both self-reported and register-based health indicators, and suggest, when possible, the inclusion of both SRH and an indicator of mental health in studies on re-employment.

Ethics approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Tacit and/or direct approval of the study data was received from the Danish Data Protection Agency and the 'Statens Serum Institut' (the national agency in charge of data on prescription medicine purchases), Denmark.

Informed consent was obtained from each individual participant included in the study.

Acknowledgments

We are grateful for the helpful comments on our paper from Anders Holm, Jan Høgelund, Vibeke Jakobsen, Mona Larsen, Signe B. Rayce, Hans H. Sievertsen, the participants at the Medical Sociology session at The 27th Conference of the Nordic Sociological Association in 2014, and seminars at University of Copenhagen and SFI – The Danish National Centre for Social Research.

References

Andersen, S. H. (2009). Unemployment and subjective well-being a question of class? *Work and Occupations*, *36*, 3–25.
Bach (2012). *Arbejdsmarkedsparathed og selvforsørgelse (Rep. No. 12:31)*. Copenhagen: SFI The Danish National Centre for Social Research.
Bach, H. B. (2009). *Lediges motivation og forsørgelse (Rep. No. 09:20)*. Copenhagen: Tha Danish National Centre for Social Research.
Bach, H. B., & Petersen, K. N. (2007). *Kontanthjælpsmodtagerne i 2006 (Rep. No. 07:02)*. Copenhagen: The Danish National Centre for Social Research.
Black, C. (2008). *Working for a healthier tomorrow*. Norwich: The Stationery Office.
Carlier, B. E., Schuring, M., van Lenthe, F. J., & Burdorf, A. (2014). Influence of health on job-search behavior and re-employment: the role of job-search cognitions and coping resources. *Journal of Occupational Rehabilitation*, *24*, 670–679.
Claussen, B., Bjørndal, A., & Hjort, P. F. (1993). Health and re-employment in a two year follow up of long term unemployed. *Journal of epidemiology and community health*, *47*, 14–18.
Claussen, B. (1993). A clinical follow up of unemployed I: Lifestyle, diagnoses, treatment and re-employment. *Scandinavian Journal of Primary Health Care*, *11*, 211–218.
Claussen, B. (1999). Health and re-employment in a five-year follow-up of long-term unemployed. *Scandinavian Journal of Public Health*, *27*, 94–100.
Damsbo, N., Holm, M., & Stage, K. B. (2015). Klinisk vejledning for almen praksis. Unipolar depression. Diagnostik og behandling. Lægeforeningens forlag. Ref Type: Online Source.
Danish Medicines Agency (2004). Forbruget af antidepressiva i Danmark i den primære sundhedssektor i perioden 1994–2003. Danish Medicines Agency. 21-4-2015, Ref Type: Pamphlet.
Danish Ministry of Health (2012). Danish Law on Health 2012. Ref Type: Bill/Resolution.
Danish Ministry of Labor (2006). *Kulegravning af kontanthjælpsområdet*. Copenhagen: Danish Ministry of Labor.
Davies, A. R., & Ware, J. E., Jr. (1981). *Measuring health perceptions in the health insurance experiment*. Santa Monica: The Rand Corporation.
DeSalvo, K. B., Bloser, N., Reynolds, K., He, J., & Muntner, P. (2006). Mortality prediction with a single general self-rated health question. *Journal of General Internal Medicine*, *21*, 267–275.
Erlangsen, A., & Fedyszyn, I. (2015). Danish nationwide registers for public health and health-related research. *Scandinavian Journal of Public Health*.

1403494815575193
Graversen, B. K., & Jensen, P. (2010). A reappraisal of the virtues of Private Sector Employment Programmes*. *The Scandinavian Journal of Economics*, *112*, 546–569.
Graversen, B. K., & Van Ours, J. C. (2008). Activating unemployed workers works; Experimental evidence from Denmark. *Economics Letters*, *100*, 308–310.
Gupta, N. D., Kleinjans, K. J., & Larsen, M. (2015). The effect of a severe health shock on work behavior: evidence from different health care regimes. *Social Science Medicine*, *136*, 44–51.
Høgelund, J., Holm, A., & Falgaard Eplov, L. (2012). The effect of part-time sick leave for employees with mental disorders. *Journal of Mental Health Policy and Economics*, *15*, 157.
Høgelund, J., Holm, A., & McIntosh, J. (2010). Does graded return-to-work improve sick-listed workers chance of returning to regular working hours? *Journal of Health Economics*, *29*, 158–169.
Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: a review of twenty-seven community studies. *Journal of Health and Social Behavior* (pp. 21–37), 21–37.
Karlson, K. B., Holm, A., & Breen, R. (2012). Comparing regression coefficients between same-sample nested models using logit and probit a new method. *Sociological Methodology*, *42*, 286–313.
Kessler, R. C., Turner, J. B., & House, J. S. (1989). Unemployment, reemployment, and emotional functioning in a community sample. *American Sociological Review* (pp. 648–657), 648–657.
Lindeboom, M., & Van Doorslaer, E. (2004). Cut-point shift and index shift in self-reported health. *Journal of Health Economics*, *23*, 1083–1099.
Patterson, L. M. (1997). Long-term unemployment amongst adolescents: a longitudinal study. *Journal of Adolescence*, *20*, 261–280.
Paul, K. I., & Moser, K. (2009). Unemployment impairs mental health: meta-analyses. *Journal of Vocational Behavior*, *74*, 264–282.
Phelps, C. E. (2000). Information diffusion and best practice adoption. *Handbook of Health Economics*, *1*, 223–264.
Rosenstock, M., Tinggaard, K., Holt, H., & Jensen, S. (2004). *Rummelighedens rammer (Rep. No. 04:22)*. Copenhagen: The Danish National Centre for Social Research.
Rosholm, J. U., Gram, L. F., Damsbo, N., & Hallas, J. (1995). Antidepressant treatment in general practice-an interview study. *Scandinavian Journal of Primary Health Care*, *13*, 281–286.
Rosholm, M. & Andersen, H. L. (2010). The Effect of Changing Mental Health on Unemployment Duration and Destination States after Unemployment. Available at SSRN 1672026.
Schuring, M., Burdorf, L., Kunst, A., & Mackenbach, J. (2007). The effects of ill health on entering and maintaining paid employment: evidence in European countries. *Journal of Epidemiology and Community Health*, *61*, 597–604.
Schuring, M., Robroek, S. J., Otten, F. W., Arts, C. H., & Burdorf, A. (2013). The effect of ill health and socioeconomic status on labor force exit and re-employment: a prospective study with ten years follow-up in the Netherlands. *Scandinavian Journal of Work, Environment Health*, *39*, 134–143.
Skärlund, M., Åhs, A., & Westerling, R. (2012). Health-related and social factors predicting non-reemployment amongst newly unemployed. *BMC Public Health*, *12*, 893.
Statens Serum Institut (2013). Forklaring til statistikken over befolkningens brug af medicin mod folkesygdomme. Ref Type: Online Source.
Taris, T. W. (2002). Unemployment and mental health: a longitudinal perspective. *International Journal of Stress Management*, *9*, 43–57.
Taris, T. W., Bok, I. A., & Caljé, D. G. (1998). On the relation between job characteristics and depression: a longitudinal study. *International Journal of Stress Management*, *5*, 157–167.
Thomsen, L. B., Holt, H., Jensen, S., & Thuesen, F. (2011). *Virksomhedernes sociale engagement (Rep. No. 11:43)*. Copenhagen: The Danish National Centre for Social Research.
Torfing, J. (1999). Workfare with welfare: recent reforms of the Danish welfare state. *Journal of European Social Policy*, *9*, 5–28.
Vallgårda, S., Krasnik, A., & Vrangbæk, K. (2001). Health care systems in transition: Denmark. *Clinical Medicine*, *3*, 464–469.
Van de Mheen, H., Stronks, K., Schrijvers, C. T., & Mackenbach, J. P. (1999). The influence of adult ill health on occupational class mobility and mobility out of and into employment in the Netherlands. *Social Science Medicine*, *49*, 509–518.
Warr, P., & Jackson, P. (1985). Factors influencing the psychological impact of prolonged unemployment and of re-employment. *Psychological Medicine*, *15*, 795–807.
WHO Collaborating Centre for Drug Statistics Methodology (16-4-2015). ATC/DDD Index 2015. Ref Type: Online Source.
World Health Organization (2007). International Statistical Classification of Diseases and Related Health Problems (ICD), 10th edition. World Helath Organization, Department of Measurement and Health Information Systems. Ref Type: Online Source.