Long Sickness absence differences between natives and immigrant workers:
The role of differences in self-reported health

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Abstract

The limited empirical evidence on sickness absence among immigrants indicates that non-Western immigrants have a higher incidence of sickness-related absence than natives. The purpose of this article is to examine whether health is a contributing factor to the immigrant-native sickness absence gap. The present article makes use of two data sources: register data (FD-trygd) with labour market and long term sickness absence information linked to a cross-section questionnaire survey on health: The Oslo Health Study (HUBRO), which was conducted in 2000–2001, (N=14,114). The findings in this article show that non-Western immigrant have a higher incidence of long term sickness absence than natives. For both women and men, the differences in long term sickness absence between non-Western immigrants and natives can be explained by poorer self- reported health among immigrants.

Keywords: immigrants, self-reported health, long sickness absence

Introduction

Sickness absence refers to a diagnosis; however, the reasons for long-term sick leave are complex and include medical, social and psychological conditions (Nordby et al. 2011). Norway has one of the highest sickness absence levels in Europe, and in June 2012, the doctor- certificated sickness absence was 5.4 per cent (NAV 2012). However, there are large variations in sickness absence depending on age, gender and social class (Laaksonen et al. 2010; Hansen and Ingebrigtsen 2008). In general, studies of the differences between immigrants and natives with respect to sickness absence are scarce. The few that exist show that non-Western immigrants have a higher degree of sickness absence than natives, while Western immigrants experience the same level as natives (Bengtsson and Scott 2008; Dahl et al. 2010; Nilsson 2005; Ziebarth and Karlsson 2009).

Theories differ regarding the mechanisms that cause sickness absence. Stress theory is one perspective that focuses on how disease and a stressful life can lead to sickness absence (Allebeck and Mastekaasa 2004). In the literature, it is generally recognised that high sickness absence is associated with poor health status and disease (see e.g.,Ziebarth and Karlsson 2009; Carneiro et al. 2010). Poor health and a longstanding illness reduce the individual's working capacity, leading, in turn, to sickness absence.

The purpose of this article is to examine whether health is a contributing factor to the immigrant-native sickness absence gap through either disparities in general health status or through differences in the prevalence of health problems. In particular, we consider the sickness absence differences between non-Western immigrants and natives for men and women separately, using a questionnaire on health (The "Oslo Health Study [HUBRO]"), which is linked to register data providing detailed information on sickness absence and labour market participation. For this study, we examine doctor-certified sickness absence of more than 16 days. One innovative aspect of this article is that we have information on the individuals' general health status and the various health problems that they face; thus, the impact of the individuals' health on the level of their sickness absence can be examined. Such information has been shortcoming in previous studies that have focused on the differences in sickness absence between immigrants and natives. Using a general subjective self-reported measure of health, we relate to the research literature that has questioned the reliability of such a measure across groups. We supplement the general subjective health measure by including a broad set of specific and potentially more objective measures of self-reported health. Another innovative aspect of this study is the possibility to merge the information on

self-reported health with register data on sickness absence. Together with the relative large number of observations we are also able to control for a range of variables.

Theoretical background and previous research

The few studies that analyse immigrant-native differences in relation to sickness absence leave a major unexplained variance, although they control for a rich set of variables including demographic, socioeconomic and labour market factors (Bengtsson and Scott 2008; Dahl et al. 2010; Nilsson 2005). Using Swedish register data, Nilsson (2005) finds that immigrants have a higher incidence of sickness absence measured as the number of absent days; however, for the number of absence spells, the patterns are about the same for immigrants and natives. Another Swedish study (Bengtsson and Scott 2008) also draws on register data and finds that there exists a large gap in sickness benefit consumption between natives and immigrants, and this gap also persists for some immigrant groups after controlling for human capital and work place factors. Using Norwegian register data, Dahl. et al. (2010) find that the observed differences in sickness absence between natives and immigrants from Eastern and Western Europe can be explained by differences in demographic and socioeconomic status as well as labour market variables; however, the sickness absence gap between natives and immigrants who originate from Asia and Africa cannot be explained by these factors. None of the mentioned studies includes information on health, which is the main contribution to this research.

In the literature, a strong correlation has already been established between socioeconomic status (SES) and sickness absence. The general finding is that sickness absence increases with decreasing socioeconomic status. A study conducted in Norway (Hansen and Ingebrigtsen 2008) shows that there is a relationship between class differences and sickness absence, particularly among men. In Denmark, Kristensen et al. (2010) show that there is quite a disparity regarding social gradient for different types of sickness absence, and that general health explains, to some degree, the social gradient related to sickness absence.

Differences in both material and psychosocial working conditions have been crucial in the explanation of social inequality in health (Shaw et al. 2007). Poor health can be a consequence of long-term exposure to demanding and stressful job conditions (Fletcher et al. 2011). Karasek's (1979) demand-control model is widely used as an explanation of the role of work in health-related social inequality. The theory focuses on stress in the workplace as a cause of health problems and the model focuses on job control and job demand. Job control relates to autonomy in the work situation and the opportunity to use and improve on one's skills. Job demands involve work speed, time pressure and the connection between work

demands and ability. A review article (Alexanderson and Norlund 2004) finds strong evidence indicating that significant control over one's own work situation reduces absence, but the correlation between high demand and absence is less solid. Non-Western immigrants are often employed in physically demanding jobs that offer less autonomy (Shields and Price 2002). Immigrants may, therefore, experience poorer health than natives because they are employed in jobs that adversely affect their health. Research indicates that the association between ethnicity and poor health are mediated by socioeconomic status (Wiking et al. 2004). As this brief overview suggests, there are both theoretical and empirical reasons to suggest that the differences in sickness absence between non-Western immigrants and natives might be caused by the differences in their work situations. The first research question to be addressed in this article is whether or to what extent a non-Western immigrant-native gap in sickness absence is found even with detailed control for occupation and industry.

The direction of causality between health, occupation and sick leave is not entirely clear, neither theoretically nor empirically. One may have poorer health due to the physically demanding nature of the work undertaken and less autonomy in the work situation, and this probably affects the degree of sickness absence; however, it could also be a health selection into different occupations that affects the degree of sickness absence, as discussed by Cai and Kalb (2006).

A review report of the international literature on migration and health (McKay et al. 2003) concludes that health is affected by ethnic differences; however, the picture is complex. The study underlines that health outcomes differ according to the individual characteristics of the immigrant, timing of migration, immigration country, host country and the kind of health outcome that is measured. Studies from Norway (Blom 2008; Kumar et al. 2008), Sweden (Hjern 2009) and the United Kingdom (Health and Social Care Information Centre 2006) show that, on average, the non-Western immigrant population reports experiencing poorer health and more health problems compared to the native population. However, there are notable variations between different immigrant groups. Moreover, the existence of a healthy immigrant effect—where immigrants are, on average, healthier than natives—is also found (Kennedy et al. 2006). Immigrants' health is related to numerous factors, such as visa categories, educational level, country of origin and years of residence (Chiswick et al. 2008).

A higher prevalence of diabetes (Wandell et al. 2010) and cardiovascular risk factors (Hempler et al. 2011; Glenday et al. 2006; Zahid et al. 2011) among the immigrant population compared to the native population has also been found. Zahid (2011) shows that obesity and negative lipid profile were high among Pakistanis living in Pakistan, but particularly prevalent

among Pakistanis living in Norway. The study discusses the results in light of changes in lifestyle after immigration. More mental health problems among the immigrant population compared to the native population are found in Norway (Dalgard et al. 2006) as well as in other European countries (Carta et al. 2005). The studies conclude that some immigrant groups, such as asylum seekers, refugees and immigrants from low-income countries, are particularly vulnerable to mental health problems.

Against this background, one possible explanation for the observed differences in sickness absence could, therefore, be that the non-Western immigrant population has poorer health and faces more health problems compared to the native population. Poorer health among non-Western immigrants might be related to the fact that many immigrants come from conflict-ridden areas, resulting in a negative effect on their health. The migration process itself can be stressful, risky and can have an adverse effect on immigrants' health. Furthermore, the new environment of the host country may have a negative influence on their health. Although health and sickness absence do not correspond one to one, several studies have shown that high sickness absence is associated with poor health status (Ziebarth and Karlsson 2009; Carneiro et al. 2010; Hultin et al. 2012). The second question that this study will address, therefore, is whether general health and different prevalence of health problems can explain all the differences between non-Western immigrants and natives with regard to sickness absence.

The Norwegian sickness benefit system

Based on international comparisons, the Norwegian public sickness benefit system is generous (OECD, 2009). If you are employed and have been for at least four weeks, you are entitled to sick pay from the first day of sickness. This entitlement is limited to a maximum of one year. The sickness benefit is "fully" wage compensated, i.e., for most workers, the benefit level is set at 100 per cent of fixed pay. However, workers with a labour income that exceeds six times the basic minimum entitlement requirements of the welfare system are not entitled to sickness benefit for income above the threshold[1], although the majority of employers also offer a top-up for high-income workers. The employer disburses sick pay for the first consecutive 16 days. After this period, sick pay is publicly disbursed and administered by the Norwegian Labour and Welfare administration (NAV). Spells of sickness up to three days are based on self-

[1]By May 2009, the basic amount was equal to 72,881 Norwegian kroner; 6G (6 times) then equals 437,286 Norwegian kroner, or approximately 52,000 euros.

certification by the worker, while any sickness absence longer than three days requires certification by a physician. Workers who are unable to return to work after one year of sickness absence are offered rehabilitation to qualify for other types of jobs. If return is impossible, disability benefits are offered.

Immigrant history and policy

Since World War II, Norway has had considerable restrictions on labour immigration from non-Western countries. The exception is a period of liberalisation between 1957 and 1975. In 1975, an "immigration stop" was implemented for citizens coming from countries outside of the Nordic region. Exceptions were made for those with specialised skills that were not available in Norway (Kjeldstadli, 2003).

Since the immigration stop of 1975, immigrants' share of the Norwegian population has increased considerably, from approximately 2 per cent of the population in 1980 to almost 10 per cent at the beginning of the new millennium. During the same period, the composition of the immigrant population has changed from being dominated by Nordic and Western immigrants to being dominated by immigrants from non-Western countries (Statistics Norway, 2012). There are immigrants living in all the communities in Norway (435 municipalities); however, they are heavily concentrated in the capital Oslo. Approximately one third of all immigrants reside in Oslo. Therefore, we argue that this is the most suitable region for analysing native-immigrant differences in sickness absence.

Data and method

Sample

This study draws on data from a cross-section questionnaire survey on health—the Oslo Health Study (HUBRO) — conducted in 2000–2001, which is linked to register data (FD-trygd) related to labour market and sickness absence information (N=14,114); around 10 per cent of the sample are immigrants. The majority of Norway's immigrants live in Oslo. Oslo residents born in 1924, 1925, 1940, 1941, 1955, 1960 and 1970 were invited to participate in the HUBRO study, and two written reminders were sent. The questionnaire included items on self-reported health and chronic diseases, dietary and smoking habits, physical activity, medication use, mental health and use of health services. After the reminders, a total of 18,770 individuals (46 per cent) participated in the survey (criteria of inclusion: written consent, presence at the screening station and/or submission of at least one questionnaire).The study population and non-respondents in HUBRO are described in detail elsewhere (Sogaard et al. 2004). The study

concludes that self-selection according to socio-demographic variables have little influence on prevalence estimates. Even though unhealthy individuals attended to a slighter degree compared to healthy individuals, social inequalities in health appeared unbiased. The main reason for the lack of research on the relationship between sickness benefits and health with special attention to immigrants is the limitations of available data on health. HUBRO is close to being the sole source of information on health for the immigrant population in Norway. The Regional Ethics Committee (REK) approved the study protocol.

Dependent variables

The dependent variable is the number of sickness absence days, i.e., we use a duration measure of sickness absence. We did also experiment with using a spell measure of sickness absence. The results did not differ much, and therefore the duration measure was chosen. We analyse long-term sickness absence since the recorded data include sickness absence of 17 days or more. Information on individual sick leave was taken from the FD-Trygd database in Statistics Norway (SSB). FD-Trygd is individual panel register data base containing a large battery of individual information on periods on employment, unemployment, sickness absence as well as other health related benefits. The data base starts in 1992. In our study, we gave access to information from 2000 and 2001.

Independent variables

The independent variables are taken both from HUBRO and the register data. In the following we describe the variables and where they are taken from.

The following variables are taken from the HUBRO survey: The participant's general health status is reported as 1) poor, 2) not very good, 3) good and 4) very good. The survey also contains a battery of questions directed at different specific health problems. The questions are divided into three categories. The first category contains five questions on whether the individual has (at present) or has had five different health problems. These are: 1) asthma, 2) bronchitis, 3) osteoporosis, 4) psychological problems for which the individual has sought help and 5) angina. Based on the answers to these questions, we construct dummy variables, taking the value 1 if the individual has or has had these health problems, and 0 otherwise. The second category contains six questions related to muscle and skeletal problems. These questions are related to 1) neck, 2) upper back, 3) lower back, 4) arms and hand, 5) hips, legs, and feet and 6) unspecified muscle and skeletal problems. More specifically, they seek to identify whether the respondent has had such problems during the last four weeks. From these questions, we

construct six dummy variables. If the respondent answers that he or she has some problems or significant problems, a dummy variable is given with the value 1; otherwise, it is 0. The third category contains a battery of 10 questions containing information related to psychological problems. These are 1) fear (suddenly feeling panicky for no reason), 2) suddenly feeling frightened or anxious, 3) feeling faint or dizzy, 4) feeling tense or harassed, 5) self-critical (easily finding fault with oneself), 6) sleeplessness, 7) feeling depressed, dejected, 8) feeling useless, of little worth, 9) feeling that everything is a burden and 10) feeling hopeless about the future. These are also constructed as dummy variables, taking the value 1 if the respondent answers some, much or very much plagued by these problems during the last week, and 0 otherwise. In total, we have 21 dummy variables measuring specific health problems.

The variable age is distinguished as follows: 1) 30 years, 2) 31–40 years and 3) 41–45 years, and 4) 46 years and older. Educational level is distinguished according to 1) compulsory education, 2) upper secondary education, 3) university/college – low level, 4) university/college – high level and 5) unknown education. Occupation is in accordance with the Standard Classification of Occupations (STYRK) maintained by Statistics Norway (Statistics Norway, 1998). We include 10 dummy variables for occupation. Marital status is coded: 0) married 1) unmarried.

From the *register*, we obtain the following variables: Immigrant status: non-Western immigrants2, Western immigrants, natives (reference category); relative number of days employed per year (a logarithmic transformation is used to interpret the coefficient as changes in per cent); number of children under six years; working time distinguishes between 1) full-time, 2) long part-time and 3) short part-time; seniority is coded: 1) < 2 years, 2) 2-5 years, 3) 6-9 years, 4) >= 10 years. We also control for industry; this is done using 12 dummy variables, based on two-digit NACE codes. The variable annual earnings cover all income from gainful employment (capital income and transfers not included). A logarithmic transformation is used to reduce the skewness of the wage distribution and ensures that the results can be interpreted in terms of proportional changes or relative differences.

Methods

The relationship between subjective health and sickness absence are analysed using Poisson regression, which is a method to model the frequency of event counts or the event rate.

[2] Non-Western immigrants include individuals born in Asia (including Turkey), Africa, South America, and Central and Eastern European countries, with two foreign-born parents. Western immigrants include the rest. We follow the definitions in Statistics Norway.

Poisson regression is a special case of a generalized linear model (GLM) with a log link, also called a Log-Linear Model and is often used for the analysis of rare events, and assumes that the outcome variable follows a Poisson distribution (Cameron and Trivedi 2010). Since our dependent variables are counts of absence days, Poisson regression is appropriate (see e.g. Østhus and Mastekaasa 2010 for a similar approach). All results are presented as marginal effects, evaluated at the mean of the explanatory variables.

A general methodological concern is related to systematic selection of individuals into jobs. Individuals with bad health may try to avoid health detrimental jobs. On the other hand, individuals with bad health may have difficulties getting access to less health detrimental jobs. We are not able to control for the potential of such systematic selection issues. But again, our concern is to compare natives and immigrants. We would only be worried if the selection into jobs and jobs are systematically different between immigrants and natives. If immigrants with bad health have more difficulties avoiding health detrimental jobs compared to natives, our health results will be a mixture of "pure" health results and results coming from working in health detrimental jobs.

Another problem is that we only have information on long term sickness absence. This is potentially problematic when we compare the measure to self-reported health. Individuals reporting self-reported health problems may not be registered with sickness if the reported sickness absence is less than 16 days. Without any further information it is difficult to say anything on the seriousness of this problem.

Can subjective health measures be trusted?

The measure that we use for self-reported health is perhaps the most commonly used indicator of overall health in general population surveys (Lindeboom and van Doorslaer 2004) and is known to correlate well with objective measures of health, such as mortality (see e.g., Frijters et al. 2010; van Doorslaer and Gerdtham 2003).[3] Still, there is some concern related to the appropriateness of such measures when it comes to comparing the answers across groups of individuals (see e.g., Currie and Madrian 1999 for a review). If different groups use different threshold levels when evaluating their health, despite having the same true health, comparison

[3] We have individual information on mortality in the period 2001-2008 and have undertaken an analysis where a binary measure of mortality is regressed against the variables measuring subjective health. The results reveal a positive and significant relationship between reporting poor health and the likelihood of dying in the period 2001-2008. Thus, in the author's material, the subjective health measure correlates well with objective measures of health, such as mortality. The scarcity of mortality observations of non-Western immigrants during this period does not enable us to analyse whether the relationship is different between natives and immigrants.

across individuals will be difficult. Reporting heterogeneity need not be a major concern if it is random. However, systematic differences in reporting behaviour are more problematic. Comparisons may be especially difficult across cultural groups with different expectations and norms (Lindeboom and van Doorslaer 2004). The severity of the bias appears to vary depending on the group. Lindeboom and van Doorslaer (2004) propose a test for differential reporting on subjective health measures. They find evidence of reporting bias for age and gender, but not for income, education or language. This evidence is encouraging for the measurement of socioeconomic inequalities in health along dimensions that are important for our study.

The empirical analyses in this article are limited to working individuals. This should, to some extent, increase homogeneity with respect to norms and attitudes towards work, which may limit the difficulties associated with making comparisons. We have no access to a set of "clean" objective health measures unlike Lindeboom and van Doorslaer (2004); however, we have and include an analysis that replaces the general subjective health measure with a set of more specific (and probably) more objective measures. We return to this in the results section.

Results

Descriptive results

Table 1 illustrates how, for men and women, the subjective ordinal health measure varies between natives and immigrants. The health measure varies from poor to very good.

Table 1 about here

Non-Western immigrants report experiencing poorer health than both Western immigrants and natives. They have higher shares in the two "poor health" categories and lower shares in the two "good health" categories. This pattern applies to both men and women. Non-Western immigrant women especially seem to report experiencing poor health compared to all the other groups. Comparing natives and Western immigrants, much smaller differences are found for both men and women.

Main results

Tables 2 and 3 present the regression results for sickness absence for men and women separately.[4] The relationships are estimated using Poisson regression analysis.

We present results from four models. Model 1 includes the immigrant variables, in addition to the relative number of days employed and the observation time variable. Model 2 adds demographic, human capital, family-related and labour market-related variables.[5] Model 3 adds information related to occupation. Finally, Model 4 adds the core variables for subjective health.

Model 1 demonstrates that non-Western immigrant men take, on average, 9.48 more sickness absence days than natives. For Western immigrants, we find a positive, but not significant, difference compared to natives. The inclusion of demographic and work-related variables in Model 2 reduces the sickness gap between natives and non-Western immigrants by approximately three days or 30 per cent. The gap is still equal to approximately six days and is highly significant.

Introducing occupation dummies, and thereby comparing natives and immigrants within occupation groups, further reduces the gap to approximately 3.75 days. Compared to the results in Model 2, controlling for occupation reduces the sickness gap by approximately 40 per cent. Therefore, comparing natives and non-Western immigrants within the same detailed occupation reduces the sickness gap. This result reveals that the sickness absence difference between natives and immigrants is partially due to immigrants being overrepresented in occupations with above-average sickness absence developments. Still, after controlling for demographic, family-related, industry and occupation differences, we find a sizeable and significant sickness absence difference between immigrants and natives.

Table 2 about here

Finally, Model 4 introduces the main variables, i.e., the health variables. The results reveal a negative, significant and strong relationship between reporting good health and sickness absence. Men who report experiencing very good health take approximately 17 fewer sickness

[4] We know that sickness absence behaviour is different for men and women. Therefore, there are good reasons for estimating them separately. A simple F-test does also show that separate analyses are warranted.
[5] In an earlier specification we also included years since migration as an explanatory variable (natives' value set to zero). The coefficient of this variable turned out insignificant and was therefore left out in the final specification.

absence days compared to men who report experiencing good health. Those who report experiencing "not very good" or "poor health" have a significantly higher incidence of sickness absence compared to those who report experiencing "good health". The differences are 15 and 20 days respectively. Introducing the health variable reduces the sickness absence gap further, and we no longer find any significant difference in sickness absence between non-Western immigrant and native men. Non-Western immigrants report experiencing worse health; furthermore, there is a negative relationship between self-reported health and sickness absence. Controlling for this compositional difference removes the native-immigrant sickness absence gap. This result suggests that subjective health differences between non-Western immigrants and natives are an important source for explaining the sickness absence difference between them.

Table 3 presents results from the same regression models for women. Model 1 shows that non-Western immigrant women take 8.35 more sickness absence days compared to natives. The opposite pattern is found for Western immigrants, but it is not significant. Introducing the control variables in Model 2 leaves the difference between non-Western and natives unaltered. Model 3 shows that controlling for occupation reduces the sickness gap considerably to approximately 5.7 days. Finally, controlling for self-reported health differences changes the sickness gap difference between non-Western immigrant women and natives dramatically from positive to negative. The relationship is, however, not significant. Table 1 shows that, compared to natives, non-Western immigrant women are heavily overrepresented among those who report poor or not very good health. This explains the significant change in the sickness absence gap between Models 3 and 4. Moreover, Model 4 shows that after controlling for general health, Western immigrant women take significantly fewer sickness absence days compared to native women, 5.4 respectively.

Table 3 about here

What kind of health differences?

We have presented results that suggest that self-reported general health differences between non-Western immigrants and natives is important for explaining the sickness absence differences between them. As previously mentioned, the limitations of self-reported general health measures as explanatory variables has been discussed by several researchers (see e.g., Currie and Madrian 1999) due to the potential problems related to self-justification as well as comparability across individuals. As a consequence, some researchers have argued that the

use of more objective, but still self-reported, health measures of specific illnesses is preferable (see e.g., Bound and Burkhauser 1999).

The HUBRO survey contains a battery of questions directed at a variety of specific health problems. The strategy now is to analyse differences in sickness absence controlling for the battery of self-reported, but somewhat more objective, health measures. We include the three categories of health problems successively. This exercise will give a picture of which type of health problems are important for explaining the sickness absence gap, and how much of the gap is left when we include the full battery of controls. Table 4 presents the results for men. Results from three models are presented. All models include the battery of controls as in Model 3 in Tables 2 and 3. We then include successively the detailed measures of health problems.[6]

Model 1 includes the first battery of health problems; Model 2 adds the battery of muscle and skeletal variables; and Model 3 adds the psychological health problem variables. Introducing the first battery of controls somewhat reduces the sickness absence gap more compared to Model 3 in Table 3 (3.759); however, the reduction is fairly modest. The introduction of the set with muscle and skeletal health problems in Model 2 matters more. The sickness gap between non-Western immigrant men and native men is now down to 1.381 days and is no longer significant.

Table 4 about here

Health problems related to neck, lower back and hips/legs/feet are especially positively related to sickness absence. Non-Western immigrants report experiencing these problems to a much greater extent than natives. This explains the major part of the reduction in Model 2. Model 3 adds the last battery of psychological problems. This reduces the sickness gap further, but more modestly compared to the introduction of muscle and skeletal problems. Problems related to sleeplessness, feeling useless, feelings of having little worth and feeling as if everything is a burden are all positively related to sickness absence. These problems are much more common among non-Western immigrants than among natives. Having introduced the full set of detailed health problems, the sickness gap between non-Western immigrant and native men is reduced to 0.917 days and is not significant. However, compared to the sickness

[6] Due to space limitations, we only present results for the immigrant variables. Results for the specific health variables are available upon request.

absence gap in Model 4 in Table 2 (-0.332), the reduction is smaller using detailed information on specific health problems.

Using the same models used for men, Table 5 presents the results for women. Controlling for the first set of health problems reduces the sickness absence gap between non-Western immigrant and natives from 5.742 in Model 3 in Table 3 to 4.499 in Table 5. As is the case for the men, controlling for muscle and skeletal problems matters. The sickness gap between non-Western immigrant women and native women is now reduced to just above 1 sickness day and is no longer significant. The introduction of the psychological health problems in Model 3 reduces the gap further (0.159). However, as is the case for the men, using the specific health problem indicators, we are unable to reduce the gap as much as we did when using the subjective health measure.

The results in Tables 4 and 5 suggest that controlling for specific health problems explains a large part of the gross difference in sickness absence between natives and non-Western immigrants. This suggests that health differences between natives and non-Western immigrants are an important factor in explaining the differences in sickness absence. Still, the results should be interpreted somewhat cautiously with regard to the overall subjective measure of health as an unbiased reflection of health differences.

Table 5 about here

Discussion and conclusions

In this article, we analyse the differences in sickness absence between natives and immigrants, paying special attention to the importance of differences in health. The data that are used come from a representative survey of natives and immigrants in Oslo in 2000 and 2001. This survey is merged with register information on the sickness absence of each individual. Previous research (Bengtsson and Scott 2008; Dahl et al. 2010; Nilsson 2005) has revealed that non-Western immigrants have a higher incidence of sickness absence than natives, even after controlling for a wide set of observable characteristics, while Western immigrants have been found to have sickness absence levels that are comparable to those of natives. This is also evident in this study's data.

In the present study, we first determine whether or to what extent an immigrant-native gap in sickness absence is found even with detailed control for occupation and industry. We then examined whether general health and different prevalence of health problems can explain

the persistent gap in sickness absence when comparing non-Western immigrants and natives employed in similar occupations.

In the empirical analyses, we first found that after controlling for occupation, the sickness absence gap between non-Western immigrants and natives is reduced considerably. To some extent, the gap between non-Western immigrants and natives can, therefore, be attributed to the fact that non-Western immigrants are employed in lower-status occupations in which the sickness absence level is high. This result is in line with the assumption that differences in health outcomes are related to differences in work environment and work autonomy (Karasek 1979). In the present study, we also observed that controlling for occupation reduces the native-immigrant sickness absence gap to a greater extent for men than for women. This result is comparable to those of a study conducted by Hansen and Ingebrigtsen (2008), who found class differences in sickness absence to be particularly prevalent among men.

Moreover, our analyses revealed that self-reported health is an important predictor of sickness absence, which is in line with the results of earlier studies focusing on the relationship between health and sickness absence (see e.g.,Ziebarth and Karlsson 2009; Carneiro et al. 2010). The results of the present study show that after controlling for general self-reported health, the sickness absence gap between non-Western immigrants and natives disappears completely. This result appears for both men and women. The results of this study show that poor self-reported health and more health problems among the non-Western immigrants play an important role in explaining the higher sickness absence among the non-Western immigrants.

The health measure in the present study is based on self-reported ratings of health taken from a question that asks the respondent to rate his or her general health status at present. The results suggest that health differences between natives and non-Western immigrants matter when explaining the differences in observed sickness absence. Still, there is some concern related to the appropriateness of such measures with regard to the comparison of the answers across groups of individuals. One approach that is frequently utilised to test the strength of the subjective health measure is the use of self-reported, but more specific (and probably) more objective, health measures. We have access to a set of 21 different specific self-reported health measures. Using these measures, instead of the general health measure, we also observe a substantial reduction in the native-immigrant sickness absence gap, and although the reduction is somewhat smaller compared to the use of the general subjective measure, we still find no significant differences in sickness absence

between natives and non-Western immigrants after including the whole set of specific reported health problems.

The strength of our study is the availability of self-reported health measures, both general and more specific measures, combined with detailed register information on sickness absence. The relatively large number of observation does also enable us to control for wide set of controls and draw more general conclusions. Some limitations apply of course as well. We mentioned earlier that the response rate in the HUBRO survey is lower for immigrants than for natives. This might raise concerns regarding the interpretation of the results. It would be reasonable to expect a lower level of sickness absence for immigrants in our study than in the population in general. Therefore, we have compared the results from the HUBRO survey with results from the use of total population register data. With access to register information on the total population of natives and immigrants in Oslo in 2000 and 2001, we are able to "re-run" the first two regression models in Tables 2 and 3. The register data do not contain information on occupation nor health; therefore, the latter two models are omitted. The results from this exercise (available upon request) show that the results for the immigrant-native sickness absence gap are quite comparable to the one that is presented in the first two models in Tables 2 and 3.

One interpretation of the results in the present article is that the general health measure is picking up real and objective (of which some are unreported) health differences. This interpretation is also based on the results of using the set of specific health problems, as they also suggest that health differences play an important role when explaining the differences between natives and immigrants with regard to sickness absence.

Given the fact that non-Western immigrant workers seem to experience poorer health and more health problems when compared to other workers, the policy implications of this study are that early and close monitoring and a good working relationship between employee, employer, the welfare services and physicians are particularly important for non-Western immigrant workers. To ensure that sick workers re-enter the workforce, it will be important to implement appropriate interventions and to adjust their work conditions at an early stage in order to hinder long-term sickness absence and reduce the need for subsequent disability pension.

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Table 1. Descriptive statistics. The subjective health measure. Share. Separated by gender and immigrant status

	Men			Women		
	Natives	Non-Western	Western	Natives	Non-Western	Western
Poor	0.008	0.038	0.014	0.005	0.036	0.007
Not very good	0.116	0.282	0.160	0.154	0.389	0.161
Good	0.616	0.560	0.623	0.566	0.467	0.603
Very good	0.259	0.119	0.202	0.274	0.108	0.228
N	5327	769	287	6630	687	426

Table 2. Sickness absence. HUBRO population. Year 2000 and 2001. Dependent variable: Number of sickness days. Poisson regression analyses. Marginal effects. Men.

Men	Model 1		Model 2		Model 3		Model 4	
	Coeff	St.error	Coeff	St.error	Coeff	St.error	Coeff	St.error
Immigrant status (ref:natives)								
Non-Western immigrants	9.480 ***	1.431	6.298 ***	1.658	3.759 **	1.791	-0.332	1.744
Western immigrants	3.154	2.839	0.848	2.687	0.136	2.719	-1.326	2.629
Relative number of days employed (log)	7.723 ***	1.227	7.735 ***	1.474	7.606 ***	1.463	7.827 ***	1.372
Age (ref:30 years)								
31-40 years			1.970	2.037	1.957	2.035	0.958	1.975
41-45 years			3.048	2.121	3.051	2.108	0.910	2.024
>=46 years			8.962 ***	1.979	9.146 ***	1.981	5.509 **	1.872
Working time (ref: Short part-time)								
Full-time			-9.850 ***	1.879	-10.500 ***	1.876	-7.208 ***	1.890
Long part-time			-13.111 **	4.550	-13.733 **	4.574	-12.527 **	4.601
Educational level (ref: upper secondary ed.)								
Compulsory education			2.293	1.551	0.962	1.564	-0.089	1.509
University/college – low level			-8.141 ***	1.522	-5.685 ***	1.569	-3.930 **	1.510
University/college – high level			-10.287 ***	1.951	-7.149 ***	2.088	-4.408 **	2.029
Unknown education			-2.085	3.317	-1.590	3.330	-0.352	3.092
Married			3.800 **	1.275	4.051 **	1.284	3.838 **	1.216
Number of children under 6 years			0.810	1.033	0.656	1.020	1.135	1.019
Labour income (log)			-1.735 **	0.660	-0.825	0.693	0.906	0.737
Seniority (ref: < 2 years)								
2-5 years			3.622	2.295	3.445	2.275	3.498	2.089
6-9 years			4.023 *	2.271	3.795 *	2.250	4.198 **	2.036
>=10 years			2.174	2.510	1.975	2.500	2.659	2.303
Occupational status (ref: elementary occupations)								
Legislators, senior officials and managers					-6.221 **	3.050	-4.245	2.998
Professionals					-10.843 ***	2.809	-8.899 **	2.776
Technicians and associate professionals					-10.826 ***	2.872	-8.857 **	2.866
Clerks					-12.906 ***	2.825	-10.487 ***	2.787
Service workers and shop and market sales workers					-3.743	2.750	-2.763	2.640
Skilled agricultural and fishery workers					-5.354 **	2.649	-4.443	2.599
Craft and related trades workers					-4.293	6.277	-0.369	8.369
Plant and machine operators and assemblers					-2.276	2.621	-1.772	2.548
Armed forces and unspecified					-2.313	2.751	-1.727	2.644
Unknown occupation					-5.540 *	3.065	-4.629	3.100
Self-reported health status (ref:good)								
Poor							20.472 ***	2.632
Not very good							15.613 ***	1.384
Very good							-17.880 ***	2.616
Control for industry?			Yes		Yes		Yes	
N	6375		6375		6375		6375	
Pseudo R2	0.027		0.134		0.149		0.258	

NOTE.–Level of significance: *** 1 per cent. ** 5 per cent. * 10 per cent.

Table 3. Sickness absence. HUBRO population. Year 2000 and 2001. Dependent variable: Number of sickness days. Poisson regression analyses. Marginal effects. Women

Women	Model 1		Model 2		Model 3		Model 4	
	Coeff	St.error	Coeff	St.error	Coeff	St.error	Coeff	St.error
Immigrant status (ref:natives)								
Non-Western immigrants	8.353 ***	1.799	8.265 ***	1.944	5.742 **	2.122	-3.834	2.189
Western immigrants	-4.893	2.905	-3.865	2.902	-3.972	2.887	-5.447 **	2.671
Relative number of days employed (log)	17.431 ***	1.646	15.668	1.864	15.302 ***	1.851	14.611 ***	1.768
Age (ref:30 years)								
31-40 years			-0.526	1.941	-0.521	1.939	-1.890	1.859
41-45 years			1.289	2.180	1.319	2.179	-1.254	2.078
>=46 years			5.358 **	2.025	5.676 **	2.019	0.585	1.942
Working time (ref: Short part-time)								
Full-time			-10.327 ***	1.873	-9.839 ***	1.851	-5.155 **	1.820
Long part-time			-5.095 **	2.583	-5.809 **	2.580	-1.731	2.513
Educational level (ref: upper secondary ed.)								
Compulsory education			7.631 ***	1.974	5.679 **	2.073	1.796	1.910
University/college – low level			-5.421 ***	1.514	-4.198 **	1.578	-2.018	1.506
University/college – high level			-9.157 ***	1.906	-6.672 **	2.006	-3.846 **	1.918
Unknown education			-4.199	5.236	-3.397	5.154	-1.267	4.494
Married			-0.451	1.327	-0.167	1.321	1.287	1.258
Number of children under 6 years			-1.631	1.304	-1.425	1.299	0.261	1.275
Labour income (log)			2.294 **	1.067	3.443 **	1.142	6.440 ***	1.151
Seniority (ref: < 2 years)								
2-5 years			3.841 *	1.995	3.591	1.986	4.027 **	1.886
6-9 years			2.563	2.126	2.615 *	2.120	1.844	2.019
>=10 years			0.748	2.426	0.837	2.403	1.940	2.276
Occupational status (ref: elementary occupations)								
Legislators, senior officials and managers					-12.474 **	4.333	-10.752 **	3.968
Professionals					-15.735 ***	4.043	-13.576 ***	3.844
Technicians and associate professionals					-12.359 **	3.607	-11.119 ***	3.441
Clerks					-8.157 **	3.298	-6.431 **	3.159
Service workers and shop and market sales workers					-11.370 **	3.423	-9.641 **	3.257
Skilled agricultural and fishery workers					-4.019	3.117	-2.417	2.992
Craft and related trades workers					-0.354	9.753	4.763	9.930
Plant and machine operators and assemblers					-6.316	6.033	-0.710	5.880
Armed forces and unspecified					7.223	5.462	5.220	5.150
Unknown occupation					-9.098 **	3.923	-7.750 **	3.722
Self-reported health status (ref:good)								
Poor							38.018 ***	3.261
Not very good							24.049 ***	1.492
Very good							-19.273 ***	2.076
Control for industry?			Yes		Yes		Yes	
N	7739		7739		7739		7739	
Pseudo R2	0.028		0.069		0.079		0.209	

NOTE.–Level of significance: *** 1 per cent. ** 5 per cent. * 10 per cent.

Table 4. Sickness absence. HUBRO population. Year 2000 and 2001. Dependent variable: Number of sickness days. Poisson regression analyses. Marginal effects. Men.

	Model 1		Model 2		Model 3	
	Coeff	St.error	Coeff	St.error	Coeff	St.error
Immigrant status (ref:natives)						
Non-Western immigrants	3.111*	1,827	1,381	1,831	0,917	1,847
Western immigrants	0,301	2,725	-0,531	2,607	-0,216	2,611
Various health measures?	Yes		Yes		Yes	
Muscle & skeletal problems?	No		Yes		Yes	
Psychological problems?	No		No		Yes	
N	6375		6375		6375	
Pseudo R2	0,156		0,19		0,216	

NOTE: In all the models, we include the set of control variables as in Model 3 in Table 3. –Level of significance: *** 1 per cent. ** 5 per cent. * 10 per cent.

Table 5. Sickness absence. HUBRO population. Year 2000 and 2001. Dependent variable: Number of sickness days. Poisson regression analyses. Marginal effects. Women.

	Model 1		Model 2		Model 3	
	Coeff	St.error	Coeff	St.error	Coeff	St.error
Immigrant status (ref:natives)						
Non-Western immigrants	4.499**	2,125	1,078	2,204	0,159	2,252
Western immigrants	-4,232	2,886	-4,768	2,824	-5.194*	2,834
Various health measures?	Yes		Yes		Yes	
Muscle & skeletal problems?	No		Yes		Yes	
Psychological problems?	No		No		Yes	
N	7739		7739		7739	
Pseudo R2	0,088		0,123		0,148	

NOTE: In all the models, we include the set of control variables as in Model 3 in Table 3. –Level of significance: *** 1 per cent. ** 5 per cent. * 10 per cent.