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Aleksander Å. Madsen & Karl Ingar Kittelsen Røberg

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Education–occupation mismatch and long-term sickness absence: a longitudinal study of over- and under-education using Norwegian population data, 2003–2013

Aleksander Å. Madsen and Karl Ingar Kittelsen Røberg

Centre for the Study of Professions, Oslo Metropolitan University, Oslo, Norway

ABSTRACT

In this study, we explore whether education–occupation mismatch in the form of over-education and under-education affects the risk of long-term sickness absence. We use register data covering the Norwegian population in the period 2003–2013, containing 13,628,079 person-year observations (2,059,989 persons). To account for selection, we controlled for unobserved occupational and individual heterogeneity. This has been lacking in previous studies of mismatch and health outcomes. Our results show that over-education increases, and under-education reduces, the probability of long-term sickness absence. Controlling for selection reduces the associations substantially. The associations also diminish with experience. These results hold across two different measures of mismatch. Furthermore, both time spent in a mismatched status and specifications of mismatch alter the probability of LTSA. We conclude that education–occupation mismatch is associated with long-term sickness absence but underscore the need for adequate controls for selection.

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Education-occupation mismatch; long-term sickness absence; over-education; under-education; socioeconomic inequality in health

Introduction

The association between socioeconomic position (SEP) and health is well documented. In addition to numerous studies of the relationship between health and social rank, there has been long-standing sociological interest in the relationship of health to a mismatch between socioeconomic indicators. The hypothesis of mismatch affecting health arose in studies of status inconsistency (Lenski 1954), which argued that dissonance can be cognitively straining (Vaisey 2006). Since then, several studies have found an association between mismatch and health (e.g. Garcy 2015; Lundberg, Kristenson, and Starrin 2009).

Education, occupation and income are common indicators of SEP. In this study, we explore the effect of mismatch between education and occupation. Individuals with an educational level that is inconsistent with the expected level for their occupation can be defined as either over- or under-educated depending on the direction of mismatch. Education–occupation mismatch is relevant in view of labour market changes in post-industrial societies. There has been concern over whether the substantial educational expansion has been followed by a similar increase in demand for higher-educated labour (Groot and van den Brink 2000). In OECD countries, including Norway, a considerable proportion of workers have higher levels of education than their jobs require (OECD 2013a).

Despite the diversity of health indicators used in research on the effects of mismatch, there is a lack of studies on sickness absence. Sickness absence is considered a global measure of health

CONTACT Aleksander Å. Madsen aleksander.madsen@sosgeo.uio.no Centre for the Study of Professions, OsloMet – Oslo Metropolitan University, St. Olavs Plass, 0130, Oslo, Norway

(Marmot et al. 1995) and is associated with SEP (Allebeck and Mastekaasa 2004). Furthermore, sickness absence is a major public health and economic problem (Henderson, Glozier, and Elliott 2005) that predicts both disability (Kivimäki et al. 2004) and mortality (Vahtera, Pentti, and Kivimäki et al. 2004). Among the OECD countries, Norway has the highest rate of sickness absence (OECD 2013b), which underscores the need for research on possible explanatory factors. In this study, we investigate the association between education–occupation mismatch and long-term sickness absence (LTSA).

In addition to studying an important outcome that has been lacking in prior research (LTSA), we address methodological concerns common in studies of mismatch and health (Garcy 2015). Principally, we add to the literature by controlling for unobserved heterogeneity. While prior research is possibly confounded by selection and overestimations of the effect of mismatch, we consider this issue by using panel data of the entire Norwegian population from 2003 to 2013 with fixed effects for both individuals and occupations.

Mismatch in the labour market

There is a vast literature on educational-occupational mismatch and its causes and consequences for labour market outcomes, which is usually related to human capital perspectives (Becker 1993), assignment models or the job-competition model (Thurow 1975). It is often debated whether mismatch is transitory caused by job-search friction and economic cycles, or more permanent due to over-investment in education and changing skill-requirements. Regardless of whether mismatch is transitory or permanent, graduates entering the labour market are especially prone to becoming mismatched. Hence, early career mismatch is often studied. Research on the consequences of mismatch focuses primarily on labour market rewards with multiple studies finding a wage-penalty for over-educated workers (Hartog 2000). However, a lack of fit can also be a stressor and has been shown to make people dissatisfied with their jobs and affect their health (Kalleberg 2007).

Mismatch and stress

The idea that mismatch can be stressful originated primarily in the theory of status inconsistency (Garcy 2015; Stryker and Macke 1978), which refers to mismatch between hierarchical status dimensions such as education and occupation (Lenski 1954). It was hypothesised that inconsistency in rank would lead to stress by subjecting the individual to inconsistent demands that can harm the self (Goffman 1957). To elaborate on explanatory mechanisms producing the assumed stress, role conflict theory was linked to status inconstancy (Stryker and Macke 1978). Inconsistency in demands was thought to stem from role conflict, whereby conflicting expectations of roles could result in frustration and uncertainty, and in turn increase psychological stress (Jackson 1962). Relative deprivation (Runciman 1966) is another candidate explanation for the assumed stress of status inconsistency (Yngwe et al. 2003). Relative deprivation can cause stress when individuals compare themselves to similar others (e.g. at the same educational level) that are more fortunate (e.g. with a higher occupational position). However, while this may be true for over-educated individuals, those of low education but high occupational position may feel relatively gratified (Runciman and Bagley 1969; Wegener 1991), possibly reducing rather than heightening stress.

Current scholars have shifted their attention to workplace stress theories, such as job demand–control (JDC) (Karasek 1979) and effort–reward imbalance (ERI) (Siegrist 1996), to explain the adverse health effects of mismatch. According to the JDC framework, psychological strain results from the combined effects of the demands of a work situation and the degree of decision latitude available for managing those demands. Two stress-inducing job types are proposed according to the kind of divergence between demands and control (Karasek 1979). High-strain jobs entail high demands and a low degree of control. Under-education could involve overload when a person works at a level above the acquired skill level if greater demands are made without additional control. The term 'passive jobs' refers to those with low demands and low control. Over-education implies a higher skill level than required, and possibly less job control, as working at a lower level often involves. Thus, over-educated individuals may work in passive jobs and experience underload (Garcy 2015).

The ERI framework predicts that emotional distress is likely to occur under conditions where workers experience high effort and low reward. Rewards come in the form of money, esteem and status control. Status control refers to the degree of control over one's own occupational position, and a discontinuity between occupational roles can produce sustained emotional distress. Job termination and downward mobility are two examples of threats to the continuity of occupational roles, as are occupational positions held with a mismatched educational background (Siegrist 1996). Thus, over-education can cause stress if effort exceeds status control. It is also possible that the efforts of the over-educated can exceed their income, because over-education is associated with a loss of income (McGuinness 2006). It is less clear how the ERI model can be adapted to predict worse health for the under-educated. However, Garcy (2015) offers one interpretation, whereby the extrinsic efforts of the demands and obligations of the workplace can produce harmful stress for the under-educated if their lack of skill outweighs the rewards associated with their current job. An alternative interpretation where under-education has a positive effect is possible because ERI is rooted in the theory of distributive injustice. ERI refers to a lack of reciprocity between costs and gains, breaching expectations of symmetric exchange (Siegrist and Marmot 2004). Wegener (1991) argued that individuals who incur costs (e.g. education) exceeding their gains (e.g. occupational position) feel unfairly treated, while those who have gained more than they invested feel fortunate. According to Lundberg, Kristenson, and Starrin (2009), this may lead to a positive association between under-education and health.

Previous research on mismatch and health

Earlier empirical studies show little support for the hypothesised association between mismatch and health. This is often attributed to deficiencies in these studies (for an overview see Vernon and Buffler 1988). Recent empirical evidence, while not unequivocal, indicates a negative association between over-education and health, while results concerning under-education are mixed and lacking.

We have only found two studies of the relationship between mismatch and sickness absence in the literature. Gjerustad and von Soest (2011) examined the role of discrepancies between occupational aspirations and achieved occupational position, and found that for young adults, not achieving aspirations was significantly associated with sickness absence. In a study of mismatch between education and social class among middle-aged men, Faresjö, Svärdsudd, and Tibblin (1997) found that men with a high educational background and low social class position had more days and periods of sickness absence. Both these studies suggest that higher qualifications or aspirations than one's current occupation reflects a higher prevalence of sickness absence. However, the significance of the opposite form of mismatch (e.g. under-education) is unclear, and none of the samples was representative of the general population.

It is hypothesised that mismatch can lead to psychological stress. Naturally, some studies have focused on mental health. Lundberg, Kristenson, and Starrin (2009) found that individuals with a higher education than their occupational position required were more at risk of negative emotional outcomes, while those with a lower education than their occupational position demanded had the lowest risk. Other studies have also found a negative association between over-education and mental health (Aronsson and Göransson 1999; Cassidy and Wright 2008; Bracke, Pattyn, and von dem Knesebeck 2013), while two studies failed to find such an association (Friedland and Price 2003; Hultin et al. 2016).

Inconsistent results have also been found in studies of mortality and cardiovascular diseases, with some results indicating increased mortality or risk of cardiovascular diseases for over-educated (Garcy 2015; Faresjö, Svärdsudd, and Tibblin 1997; Peter, Gässler, and Geyer 2007; Honjo et al. 2014), while other studies have detected no significant relationship (B. T. Smith et al. 2012; Braig et al. 2011). Similarly, some studies of self-rated health have found a negative association with overeducation (P. Smith and Frank 2005; Johnson and Roy Johnson 1997) while other studies have yielded mixed results (Hultin et al. 2016; Johnson and Roy Johnson 1999).

A possible preliminary stage of deteriorating mental health is falling job satisfaction. Two studies have found an association between over-education and job dissatisfaction (Maynard, Joseph, and Maynard 2006; Vaisey 2006). A third study of young workers found a similar result, but the association diminished greatly with experience (Verhaest and Verhofstadt 2016).

Sickness absence as a concept and outcome

Studying sickness absence can be challenging. First, it cannot be understood as a simple measure of health, but instead as an *illness behaviour* (Mastekaasa and and Dale-Olsen 2000). This concept refers to the fact that illness and diagnosis have a social component negotiated by patient and physician leading to extraordinary variations in responses between people with comparable symptoms (Mechanic 1995). Consequently, sickness absence is a global measure of health resulting from a complex interplay between biological, physiological, psychological and sociological processes. Thus, aggregated patterns of sickness absence are highly heterogeneous and not reducible to one major mechanism. Notwithstanding this, sickness absence is strongly associated with health (Marmot et al. 1995), making it plausible that if education–occupation mismatch affects health, it also affects the risk of sickness absence.

Second, in addition to its complexity, the outcome of sickness absence is susceptible to both health selection and indirect selection. Health selection implies a reverse causal relationship between health and an independent variable (e.g. mismatch), where the former affects the latter, but not vice versa. By contrast, indirect selection involves a third variable (e.g. early life determinants) affecting both health and the independent variable, indicating a spurious relationship (Blane, Smith, and Bartley 1993). Both health selection (Kröger, Pakpahan, and Hoffmann 2015) and indirect selection (Foverskov and Holm 2015) seem important for explaining the relationship between SEP and health. For sickness absence specifically, early life determinants appear to mediate, at least in part, the relationship with SEP (Henderson et al. 2012). In research on mismatch and health, selection has rarely been taken into consideration. While our analytical strategy does not fully address health selection, it improves on previous studies by accounting for all time-invariant unmeasured heterogeneity, as described below.

Analytical aims

We study the overall relationship between education–occupation mismatch and LTSA. In addition, we have four analytical aims. First, we wish to demonstrate the importance of accounting for unobserved heterogeneity. This has been lacking in research on mismatch and health.

Second, we compare two different measures of mismatch since there is a considerable debate in the literature over measures (Vaisey 2006). In our study we focus on the realised matches (RM) method (Verdugo and Verdugo 1989), which has been criticised for not containing information on actual skill requirements of the job and for being subject to cohort effects (Leuven and Oosterbeek 2011). We test the robustness of the RM classification by including a job analysis (JA) approach where occupations are classified not by the observed mean level of education within each occupation, but by an expert assessment of educational requirements of occupations. While the RM classification may capture feelings of over- or under-education relative to matched peers and hence be associated with mechanisms of relative deprivation and gratification, it may not capture mechanisms working through skill mismatch. Using a JA approach can complement this approach by explicitly building on the skill requirement of occupations. In particular, the JA approach may be more robust in the presence of fluctuations in the demand and supply of skills. In such settings, the RM method could underestimate mismatch when there is a homogeneous over- or undersupply of a skill.

Third, we want to explore whether duration of exposure increases the magnitude of the association between mismatch and LTSA. Over-education is a long-term phenomenon for many (Rubb 2003), and there are reasons to believe that the effect of mismatch on health will accumulate as a result of long-term rather than transient states of mismatch (Garcy 2015). In research on stress, the cumulative effect on health over time has been emphasised (Pearlin et al. 2005). For example, the ERI framework posits that long-term exposure to an imbalance between effort and rewards increases the risk of stress-related disorders (Siegrist 2005).

Finally, we want to explore how different threshold values of mismatch influence the estimated association between mismatch and LTSA. The association may vary according to the severity of mismatch. Furthermore, the threshold for defining mismatch using the RM method has been criticised for being arbitrary (Vaisey 2006). To remedy this, we offer additional analyses to test the sensitivity of chosen threshold values.

Data & methods

Data

The data were obtained from public administrative registers and covers the entire Norwegian population. Occupational information is available from 2003 to 2013. All individuals who completed their education after 1974 were included. We followed labour market careers starting from date of highest level of education attained. Individuals with more than 14 years of upper secondary and university education were deemed to be outliers and excluded (<1%). Based on these criteria, the data consisted of 2,059,989 people accounting for 13,629,079 person-years. The average individual contributed 6,6 person-years. 1,673,984 individuals experienced no change in their matching status, while 386,005 individuals experienced one or more changes in their status over time. Transition probabilities are reported in online supplementary table S1.

Long-term sickness absence

LTSA is physician-certified absence over 16 days. The sickness benefit is paid to all members of the National Insurance Scheme aged 18 to 67 years who are incapable of working because of a medical condition. They are entitled to a benefit of 100% of the most recent wage up to a maximum of 52 weeks of absence if certain conditions are met. All records of LTSA is available from the register of the Norwegian Labour and Welfare Organisation. Based on the exact registered start and end dates, we construct a yearly variable that measures whether an individual has experienced any LTSA spells within a given year. In our person-year structure, individuals can have several incidences of LTSA over the 11-year panel. This measurement captures person-year incidence of LTSA and is thus higher than a cross-sectional measurement.

Education–occupation mismatch

Occupations are coded according to a seven-digit occupational code based on the ISCO-88 scheme, which amounts to 5963 unique occupations. We measure length of education as the number of semesters attended beyond compulsory schooling for all types of educations, including both academic and vocational tracks. To measure mismatch, we estimated the average level of education for each occupation based on all workers in that role. To account for changes in the labour market and educational inflation, we estimated the mean for each year. Following Verdugo and Verdugo (1989), we defined those who were more than one standard deviation (SD) above or below the mean for their occupation as over-educated or under-educated, respectively. Furthermore, we used a finer-grained classification of mismatch whereby we defined a weak mismatch as being 0.5 to 1 SD from the mean, a moderate mismatch as 1 to 2 SD from the mean and a severe mismatch as over 2 SD

Table 1. Cross tabulation between Realised matches and job-analysis measurement of mismatch. percentages in parentheses.

Realised Matches	Job-analysis			
	Match	Under-education	Over-education	Total
Match	3 875,807	826,951	3 920,797	8 623,555
	(44.94)	(9.59)	(45.47)	(100.00)
Under-education	559,392	1 418,108	25,672	2 003 172
	(27.93)	(70.79)	(1.28)	(100.00)
Over-education	195,878	594	1 484,770	1 681,242
	(11.65)	(0.04)	(88.31)	(100.00)
Total	4 631,077	2 245,653	5 431,239	12,307,969
	(37.63)	(18.25)	(44.13)	(100.00)

from the mean. We also tested a continuous operationalisation of mismatch (see online supplementary table S7).

The JA method (Vaisey 2006) for classifying over- and under-education was based on the occupational coding scheme from Statistics Norway, which assigns each occupation to a competence level (Statistics Norway 1998). If the required competency level of the occupation is lower than a person's educational attainment, the person is classified as overeducated, if the competency level is higher, the person is classified as undereducated.

Table 1 shows that the RM-measure and the JA-measure classify many observations differently. This is especially true for over-education where the RM-measurement classify 1,681,242 while the JA-measure classify 5,431,239 observations as over-educated. However, the observations that are classified as over-educated in the RM-measure are nearly all classified as over-educated in JA-measure with an overlap of 88%. For under-education the number of observations is more consistent.

Control variables

Separate analyses by gender were conducted because of higher sickness absence rates for women than men (Bekker, Rutte, and van Rijswijk 2009). We included experience because the effect of mismatch is possibly influenced by labour market participation and the passage of time in general. Experience is proxied as number of years since last spell of education. To model a relationship between experience and health-related labour market outcomes, we factored the square of experience into our model. We also included educational field, age and the total number of years of education in the pooled models (see Table 2 for descriptive statistics). In addition to these control variables, we included fixed effects on individuals and occupations, which will be discussed further below.

Empirical model

To consider selection, we deploy a model accounting for both individual and occupational heterogeneity. Health, educational attainment and occupational position covary with unobserved individual-level characteristics, probably confounding the relationship between health and mismatch. A way to deal with unobserved heterogeneity is to use individual fixed effects. By measuring all variables at the individual level, unobserved individual characteristics can be accounted for as long as they are not time variant themselves. Fixed effects for occupations at the three-digit level are also included because occupational characteristics influence the likelihood of sickness absence (Allebeck and Mastekaasa 2004), and the literature on status inconsistency stresses that the main effect of social positions must be controlled for (Blalock 1966). We also included an interaction term between experience and over- and under-education in all our models.

Table 2. Descriptive statistics.

Variables	Mean	SD
Over-education classical (1+ SD)	0.14	0.34
Under-education classical (1+ SD)	0.16	0.37
Over-educated weak (0.5–1 SD)	0.14	0.34
Over-educated moderate (1–2 SD)	0.11	0.31
Over-educated severe (2 + SD)	0.03	0.16
Under-educated weak (0.5–1 SD)	0.17	0.37
Under-educated moderate (01–2 SD)	0.16	0.36
Under-educated severe (2+ SD)	0.01	0.09
Years of over-education	0.99	1.6
Years of under-education	1.09	1.54
Years of education after completing lower secondary education	4.72	3.16
Age	41.24	11.05
Experience (years since last educational spell)	12.71	9.64
Sex (women = 1)	0.46	0.5
Long-term sickness absences	0.23	0.42
N = 13,629,079 person-years (2,059,989 persons)		

Additionally, we address how time under conditions of mismatch may alter the association by dropping the short spells of over-educated, under-educated and matched in a stepwise manner to compare increasing spells of match and mismatch for each person. This leaves us with four models. The first model keeps all occupational spells longer than 1 year, the second keeps all spells longer than 2 years, the third keeps all spells longer than 3 years, and the fourth mode only keeps spells longer than 4 years in length (which is the maximum, given the panel design and the 11-year limit). Furthermore, we investigate how different threshold values of mismatch influence the estimated association between mismatch and LTSA. This is done by substituting the common 1 SD threshold (Verdugo and Verdugo 1989) with three categories of mismatch: Weakly mismatched (0.5–1 SD), moderately mismatched (1–2 SD) and severely mismatched (over 2 SD).

To estimate the association between education–occupation mismatch and LTSA, we use a linear probability model (LPM). This makes it possible to calculate average marginal changes in probability for each variable. A major advantage of LPMs over methods such as logistic regression is that they are less sensitive to differences in unobserved heterogeneity across models that may influence the size of the estimates (Mood 2010). Specifying a logistic regression did not alter the substantive interpretation of the results (see online supplementary table S6). We cluster standard errors for individuals.

We present only the coefficients for education-occupation mismatch in the analyses. The complete regression results are available in online supplementary tables S2-S5.

Results

Figure 1 shows the association between over- and under-education and LTSA across four model specifications with separate analyses by gender. Model 1 is the pooled model where we only control for educational level, educational field, age, experience, experience squared and interaction between mismatch and experience. In model 2, we control for occupational differences. In model 3, we include individual fixed effects. In model 4, we include both controls for occupation and individual fixed effects. We consider model 4 to be the most appropriate specification, as it contains both individual and occupational controls. The interaction term between mismatch and experience implies that the coefficients in our models varies with time. In our figures we report the coefficients setting experience to zero. See online supplementary tables S1-S5 for the interaction term.

In Figure 1, all models show an increase in the probability of LTSA for the over-educated, for both men and women. The size of this positive association depends on the specifications of the model. In model 1, the increase is 5.7 percentage points (pp) for men and 3.9 pp for women, which is a large increase considering that the average prevalence in a year is around 22% for our sample. However,

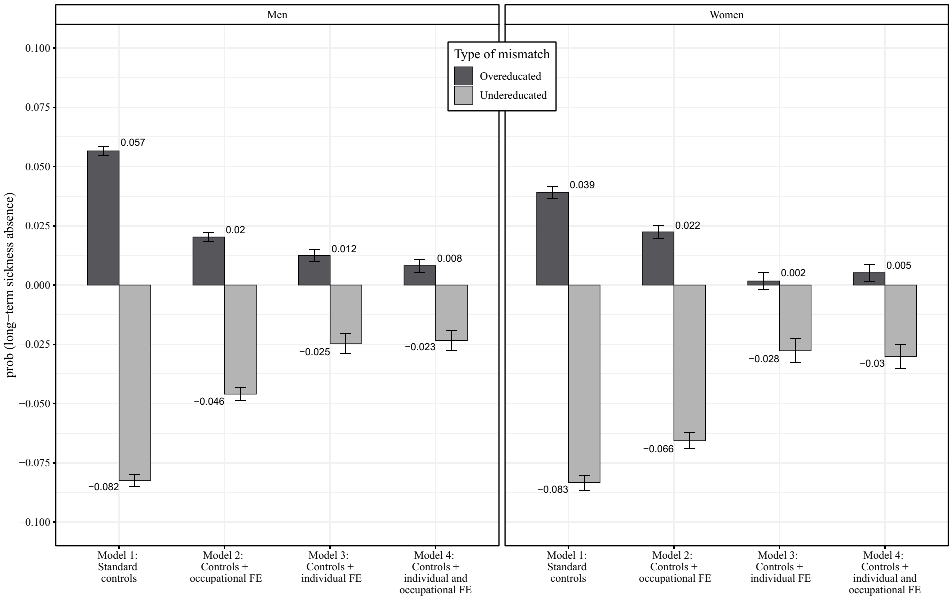

Figure 1. Change in probability of experiencing long-term sickness absence for over-educated and under-educated individuals (baseline = matched, experience = 0). Note: Model 1 includes controls for educational level, educational field, age, experience and experience squared, and interaction between over/under-education and experience. Model 2 adds a control for occupation to model 1. Model 3 adds individual fixed effects to model 1. Model 4 adds controls for both occupation and individual fixed effects to model 1; 95% confidence interval error bars; Norway, 2003–2013, Model 1–4: Men (N) = 7,392,519, Women (N) = 6,236,560; See online supplementary table S2 for a complete list of covariates and estimates.

occupational (model 2) and individual (model 3) fixed effects reduces the association between over-education and LTSA. Finally, when we account for both individual and occupational fixed effects simultaneously in model 4, the remaining positive association is quite modest. Being over-educated shows an increase in the probability of LTSA by 0.8 pp for men and 0.5 pp for women. For the under-educated, the trend is similar, but with a negative association reducing the probability of experiencing LTSA. The size of the association in model 1 is large; being under-educated reduces the probability of LTSA by 8.2 pp for men and 8.3 pp for women. Introducing appropriate controls reduces this association substantially. In model 4, being under-educated is associated with a reduction in the probability of LTSA of 2.3 pp for men and 3 pp for women. For all our models, the association between over- and under-education and LTSA diminish with experience.

Figure 2 compares the results of mismatch operationalised according to the RM method versus the JA method. The figure is based on models with fixed effects for both occupations and individuals (model 4 in Figure 1). The figure shows that the results do not vary substantially. For overeducation, the association is larger using the JA method (2 pp) compared to the RM method (0.5 pp), but only for women. For undereducation, the association is smaller using the JA method compared to the RM method for both genders.

Figure 3 shows that as we go from shorter to longer spells of over- and under-education, the size of the association increases. Thus, time spent in a mismatched status covaries with the probability of experiencing LTSA. Keeping only occupational spells of over 1 year in duration, over-educated men and women showed an increase in the probability of LTSA of 1.4 and 2.1 pp, respectively; for under-educated men and women, it is a decrease of 3.5 and 4.1 pp. When the sample is restricted to the longest spells (> 4 years), LTSAs' positive association with being over-educated and negative association with being under-educated increase in magnitude. Over-educated men and women

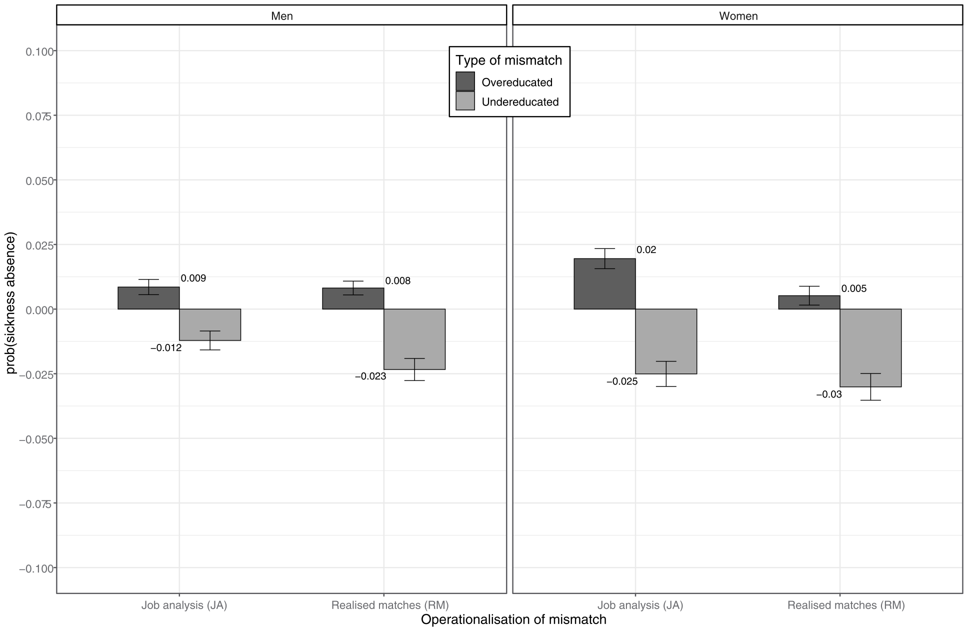

Figure 2. Change in probability of experiencing long-term sickness absence for over-educated and under-educated individuals (baseline = matched, experience = 0). Mismatch operationalised according to the realised matches method versus job analysist method. Note: Control for experience, experience squared and interaction with experience, individual and occupational fixed effects; 95% confidence interval error bars; Norway, 2003–2013, Men (N) = 7,392,519, Women (N) = 6,236,560; See online supplementary table S3 for a complete list of covariates and estimates.

show an increase in the probability of LTSA of 2.1 and 5.7 pp, respectively. For under-educated men and women, there was a decrease of 8.3 and 8 pp.

In Figure 4, we explore whether the association between LTSA and mismatch differs across three specifications: the weakly mismatched (0.5–1 SD), the moderately mismatched (1–2 SD) and the severely mismatched (over 2 SD). For over-education, the weakly mismatched men and women show an increase in the probability of LTSA of 1 and 1.3 pp, respectively. The moderately mismatched show an increase of 1.2 pp for both men and women. The severely mismatched show an increase of 0.7 pp for men and 0.2 pp for women. Regarding under-education, the weakly under-educated show a decrease of 2 pp for men and 2.1 pp for women. The moderately under-educated show a decrease of 3.8 pp for men and 4.5 pp for women. The severely mismatched show a decrease of 2.9 pp for men and 5.3 pp for women. Overall, Figure 4 shows that the association between LTSA and mismatch is sensitive to the chosen threshold value. However, the association holds across specifications, except for severely over-educated women.

We have also done robustness tests in addition to the presented results. Restricting our analysis to a balanced as opposed to unbalanced panel did not alter the results (see online supplementary figure S1). Running our analysis separately by birth cohort did not alter the results for men but reveals that the association between LTSA and mismatch is larger for younger cohorts of women (see online supplementary figure S2).

Discussion

Education–occupation mismatch was associated with LTSA in our study. The over-educated showed a higher probability of LTSA, while the under-educated showed a lower probability than matched

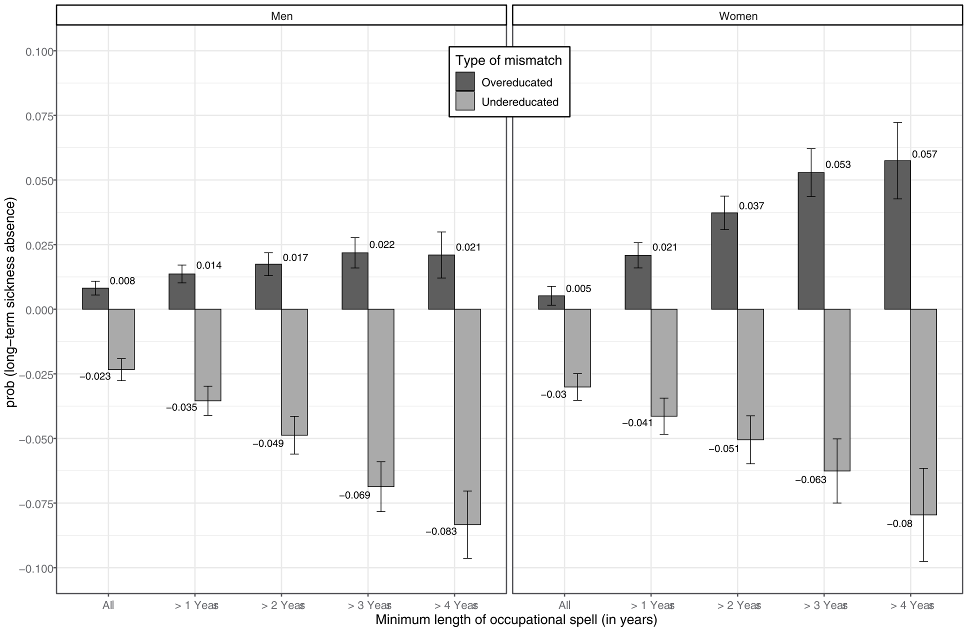

Figure 3. Change in probability of experiencing long-term sickness absence for over-educated and under-educated individuals (baseline = matched, experience = 0), stepwise dropping the shortest occupational spells. Note: Controlled for experience, experience squared and interaction with experience, individual and occupational fixed effects; Compares time spent in an education–occupation mismatched state; 95% confidence interval error bars; Norway, 2003–2013.- All: Men (N) = 7,392,519, Women (N) = 6,236,560,- 1 < Time: Men (N) = 7,048,478, Women (N) = 5,901,427,- 2 < Time: Men (N) = 6,590,938, Women (N) = 5,446,617,- 3 < Time: Men (N) = 6,081,913, Women (N) = 4,971,483,- 4 < Time: Men (N) = 5,581,533, Women (N) = 4,490,787. See online supplementary table S4 for a complete list of covariates and estimates.

individuals. However, the associations were substantially reduced when occupational and individual heterogeneity were accounted for. Nevertheless, in the final model, the over-educated showed an increase in the probability of LTSA by 0.8 pp for men and 0.5 pp for women, while the under-educated showed a decrease in the probability by 2.3 pp for men and 3 pp for women, compared with matched individuals. Moreover, the results also showed that the association between mismatch and LTSA diminished with experience. Additionally, we compared two different measures of mismatch, the realised matches and the job analysis method. They yielded approximately the same results. Furthermore, being mismatched for a prolonged period amplified both the negative association of over-education and the positive association of under-education with LTSA. Finally, different and finer-grained specifications of mismatch yielded consistent results with somewhat varying estimates.

The association between LTSA and education–occupational mismatch in our study were modest after we controlled for occupational and individual heterogeneity. Considering that sickness absence is a complex phenomenon, it may be unreasonable to expect a single variable to contribute extensively to predicting LTSA. In addition, disentangling the role of mismatch from associated factors improves the precision of the measured relationship. In studies of SEP on health, appropriate controls have been shown to reduce this association substantially (Foverskov and Holm 2015; Kröger, Pakpahan, and Hoffmann 2015). Previous studies of mismatch and health have not accounted for selection to the same extent as the present study, thus risking biased results. Furthermore, occupational and individual controls address a concern in the status inconsistency literature regarding the importance of including the main effect of social position to isolate the effect of a mismatch in positions (Blalock 1966). Likewise, work environment is presumably associated with both individual and occupational characteristics, underscoring the need for these controls.

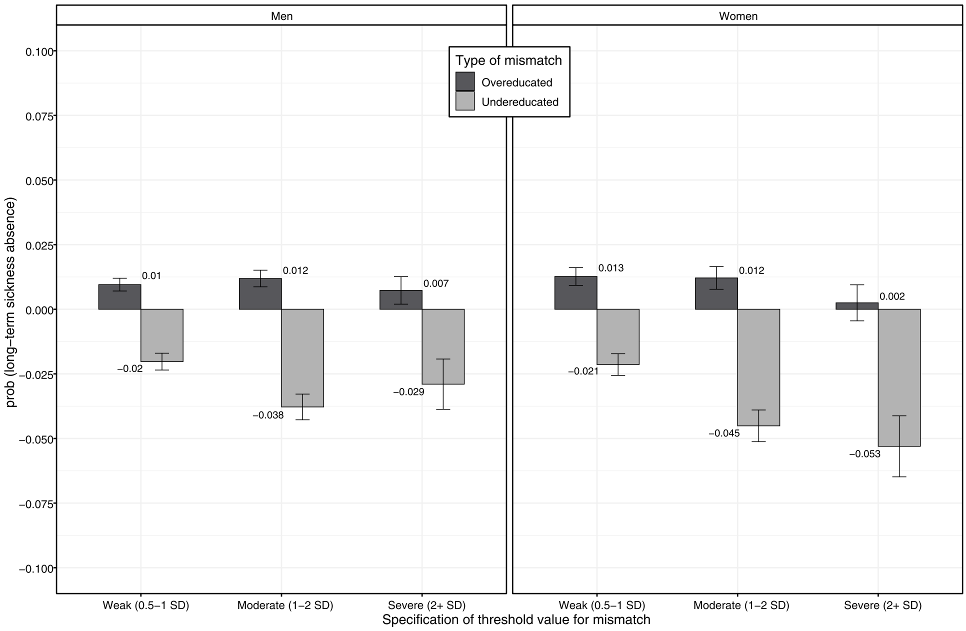

Figure 4. Change in probability of experiencing long-term sickness absence for over-educated and under-educated individuals (baseline = matched, experience = 0), testing different specifications of mismatch. Note: Control for experience, experience squared and interaction with experience, individual and occupational fixed effects; Three specifications of threshold value for mismatch: 0.5–1 SD, 1–2 SD, and 2+ SD; 95% confidence interval error bars; Norway, 2003–2013, Men (N) = 7,392,519, Women (N) = 6,236,560; See online supplementary table S5 for a complete list of covariates and estimates.

In our final model in Figure 1, over- and under-education were associated with LTSA for both men and women. Being over-educated showed an increase in the probability, which is consistent with previous research on sickness absence (Faresjö, Svärdsudd, and Tibblin 1997; Gjerustad and von Soest 2011). The underlying cause may be worse mental health (Lundberg, Kristenson, and Starrin 2009) or a higher risk of cardiovascular diseases (Peter, Gässler, and Geyer 2007), both associated with over-education. Over-education is also associated with lower job satisfaction (Verhaest and Verhofstadt 2016), which in turn is related to sickness absence (Marmot et al. 1995). There are several candidate explanations for the negative relationship between over-education and LTSA. Over-education can cause harmful stress through role conflict if the individual experiences inconsistent demands and expectations when interacting with others (Jackson 1962). It may also induce feelings of relative deprivation if the over-educated compare themselves to similar others at the same educational level but in a higher and matched occupational position (Runciman 1966). Both passive jobs with low demand and low control (Karasek 1979) and an imbalance between rewards (e.g. income and status control) and effort (Siegrist 1996) may cause stress for the over-educated in the workplace. It exists empirical support for an association between sickness absence and role conflict (Lund et al. 2005), relative deprivation (Helgertz, Hess, and Scott 2013), JDC (Virtanen et al. 2007) and ERI (van Vegchel et al. 2005).

The present study showed a lower probability of LTSA for the under-educated across all models. While less attention has been paid to under-education in research on mismatch, our results are consistent with studies of mental health (Lundberg, Kristenson, and Starrin 2009) and mortality (Garcy 2015). The theoretical contributions presented above offer candidate explanations for both negative and positive effects of under-education, depending on the interpretation. According to the theory of relative deprivation, this could be the result of the under-educated feeling gratified compared with references (e.g. other individuals or past self) of the same educational level, but in lower occupational positions (Runciman and Bagley 1969). In our fixed effects model, time-variant intra-individual upward mobility was associated with a reduction in the probability of LTSA. A similar argument can be made for the ERI model, where an imbalance between efforts and rewards can be seen as an imbalance between costs and gains resulting in favourable feelings for the under-educated because they gained (an occupational position) more than they invested (in education) (Wegener 1991).

Admittedly, it is puzzling that being under-educated is associated with a lower probability of LTSA than being matched since the former supposedly implies a lesser fit for the job. However, the RM measure implies that a significant number of employers are recruiting workers who have less skills than necessary to perform the job since mismatch is measured as deviations from the average level of education within occupations. If we assume that employers only hire workers with sufficient skills, an alternative interpretation of the RM measure is that the under-educated are matching the requirements for the job, while matched and over-educated individuals are moderately and severely over-educated, respectively. If this interpretation of the RM measure is valid, the results of the present study indicates that matched (formerly under-educated) workers have the lowest probability of LTSA, while moderately over-educated (formerly matched) workers have a somewhat higher and severely over-educated (formerly over-educated) workers have the highest probability of LTSA.[1] Future research should investigate the relationship between mismatch and health with other measures of mismatch.

Relatedly, education-occupation mismatch can be understood in both absolute and relative terms. The debate over measures of mismatch is mainly preoccupied with absolute differences in skills between individuals in similar jobs. A precise measure of skills is desirable when studying the effect of skill-mismatch on productivity. Regarding health, having more or less skills than required in a job can lead to a passive or high strain work situation, increasing the risk of sickness absence. However, a measure of education-occupation mismatch emphasising relative differences may be desirable if the association between mismatch and health works through mechanisms of relative deprivation and gratification. Consequently, while the RM measure of mismatch is disputed in the economic literature (Leuven and Oosterbeek 2011), it is arguably appropriate in studies of health outcomes. Considering this, we compared both a RM and JA measure of education-occupation mismatch and the results remained robust across these two measures.

Mismatch may have serious consequences for health primarily because of long-term rather than transient experiences of mismatch (Garcy 2015). In our fixed effects approach, we studied the association between changing from one matching status to another and LTSA. To explore the cumulative effect of mismatch, we accounted for time in a mismatched position. When the shortest intervals are excluded, the association between LTSA and both kinds of mismatch increase substantially. Considering that many are in a lasting state of over-education (Rubb 2003), the cumulative increase in the probability of LTSA adds to the relevance of preventing over-education. The association between being under-educated and LTSA also increased over time. As time spent as under-educated went on the probability of LTSA got lower. In the framework of relative deprivation (Runciman 1966), it is possible that the increasing association over time is a result of a changing frame of reference. Longer spells of matched status followed by downward mobility may induce a stronger feeling of relative deprivation compared with transient spells. Likewise, longer spells of match may increase the magnitude of relative gratification felt after upward mobility.

We also explored different specifications of education–occupation mismatch to address the concern of the arbitrary threshold value of 1 SD for defining mismatch (Vaisey 2006). We ran the results including finer-grained specifications with weak, moderate and severe mismatch. The results were equal in direction, but with different sizes of the coefficients, across all specifications except for severely mismatched women. We believe the latter may be the result of few observations in an unusual labour market position. Furthermore, it is interesting that the weakly over-educated showed a higher probability of LTSA, similar to those for more serious forms of over-education. However, this pattern does not hold for the under-educated. The weakly under-educated had a substantially lower reduced probability of LTSA than the more strongly under-educated. Moreover, the stability of patterns across specifications for over-education implies a non-linear form, while the patterns for under-education more closely resemble a linear relationship. The divergent patterns may be attributed to different selection mechanisms into over- and under-education, because the severely over-educated can only experience upward mobility, while downward mobility is the only option for the severely under-educated. Consequently, definite conclusions regarding choice of threshold value and functional form are challenging. However, all values yield associations in a consistent direction in this study.

Limitations and advantages

This study has some limitations. First, the use of observational data excludes to some extent any straightforward causal interpretations of the results. We have addressed this by eliminating time-consistent individual and occupational heterogeneity. However, our fixed effects approach does not account for time-variant individual heterogeneity. Additionally, it leaves us with only within-individual variation, not between-individual variation, so it excludes variation from those with a stable education–occupation configuration when we estimate the association between mismatch and LTSA. Secondly, our design cannot exclude reverse causality if individuals with deteriorating health selects into mismatch over time. Third, our classification of mismatch is based on the average distribution of educational level over occupations. A drawback is that it does not fully capture all relevant dimensions, such as skills, trainability and motivation. To address this, we included a JA measure of mismatch. However, this classification contains a quite crude measurement of occupational skill level (see Statistics Norway 1998). A more precise measure of attained and required skill level would have improved the present study. Fourth, the impact of mismatch on health may be contingent upon the individual perception of own fit, thus requiring a subjective measure of mismatch. Fifth, several theoretical perspectives motivate this study. Our data do not allow us to explore explanatory mechanisms discriminating between alternative explanations. Finally, information on diagnosis may help disentangle the underlying causes of LTSA.

This study contributes to the literature by using high quality longitudinal population data following individuals for up to 11 years to study LTSA. Research on LTSA has been lacking in studies relating mismatch to health. The panel structure of the data allows us to control for unobserved individual and occupational heterogeneity. Such controls have been missing in studies of mismatch and health, and our results illustrate the importance of addressing this problem. The longitudinal data allow us to explore the importance of time spent in mismatch, and the sample size makes it possible to estimate different specifications of mismatch.

Conclusion

This study indicates a relationship between education–occupation mismatch and LTSA. We find an increase in probability of LTSA for over-educated individuals and a decrease for under-educated individuals compared with those in a matched status. The associations weakened with experience. The results were sensitive to controls for unobserved occupational and individual heterogeneity, time in a mismatched state and the specification of mismatch. Nevertheless, we found a consistent pattern across all models and two different measures of mismatch. The influence of education–occupation mismatch may be attributed to feelings of role conflict or relative deprivation, or an imbalance between job control and job demands or efforts and rewards. It is well known that socioeconomic position is associated with both health and sickness absence (Allebeck and Mastekaasa 2004). Our study shows that a mismatch of positions in itself is important for understanding why some individuals are more prone to LTSA than others.

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Notes on contributors

Aleksander Å. Madsen is a former PhD candidate at the Centre for the Study of Professions, OsloMet – Oslo Metropolitan University and is currently a post doctoral fellow at the Department of Sociology and Human Geography at the University of Oslo and a senior researcher at NIFU (Nordic Institute for Studies in Innovation, Research and Education). His research interests include social inequality and stratification, health inequalities, labour market attachment, career trajectories, transition from education to work, and welfare and social insurance policies.

Karl Ingar Kittelsen Røberg is a postdoctoral research fellow at the Centre for the Study of Professions, OsloMet – Oslo Metropolitan University. Among his research interests are how higher education is rewarded in the labour market, social closure and signalling theory, and how education relates to occupations and skills.

ORCID

Aleksander Å. Madsen http://orcid.org/0000-0002-6089-3504
Karl Ingar Kittelsen Røberg http://orcid.org/0000-0002-8734-6527

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