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Norwegian doctors still happy?

Job satisfaction among Norwegian doctors 2010 – 2017 based on repeated surveys

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ABSTRACT

OBJECTIVE

To assess job satisfaction for different categories of Norwegian doctors from 2010 to 2016-17.

DESIGN

Cross sectional surveys in 2010, 2012, 2014 and 2016-17 of partly overlapping samples.

SETTING

Norway from 2010 to 2016-17.

PARTICIPANTS

Doctors in different job categories. Response rates were 67% (1014/1520) in 2010, 71% (1279/1792) in 2012, 75% (1158/1545) in 2014 and 73% (1604/2195) in 2016-17. The same 548 doctors responded at all four points in time.

MAIN OUTCOME MEASURE

Job Satisfaction Scale (JSS), a 10-item validated instrument, with sum scores ranging from 1 (low satisfaction) to 7 (high satisfaction).

ANALYSIS

GLM, controlling for gender and age, and paired t-tests.

RESULTS

For all doctors, the mean scores of JSS decreased significantly from 5.52 (95% confidence interval 5.42 to 5.61) in 2010 to 5.30 (5.22 to 5.38) in 2016-17. The decrease was significant for GPs (5.54, 5.43 to 5.65 vs. 5.17, 5.07 to 5.28) and doctors in hospital (5.14, 5.07 to 5.21 vs. 5.00, 4.94 to 5.06). Private practice specialists were most satisfied, followed by GPs and hospital doctors. The difference between the GPs and the private practice specialists increased over time.

CONSCLUSIONS

From 2010 to 2016-17 job satisfaction for Norwegian doctors decreased, but it was still at a relatively high level. Several small and large health care reforms and regulations over the last decade and changes in professional culture may explain some of the reduced satisfaction.

KEYWORDS: Job satisfaction, doctors, Norway, repeated surveys

Strengths and limitations of the study

- The study describes changes in job satisfaction among doctors in Norway from 2010 to 2016-17.
- The data allow for generalisation to the whole doctor workforce in Norway.
- Analyses are based on self-reported questionnaire data with the possibility of both over- and underestimation.

INTRODUCTION

In spite of an international trend of increasing career unhappiness,[1-7] the job satisfaction level of Norwegian doctors has been higher than in comparable countries like Germany,[8 9] Iceland[10] and the US.[11] The satisfaction level in Norway has been stable and high from 1994 to 2002[12] and even increasing from 2000 to 2006.[13] General practitioners have at all points in time been significantly more satisfied than hospital doctors.[13 14]

Doctor wellness is crucial to the delivery of good health care and has been identified as a missing quality indicator.[15] Satisfaction is a substantial element of professional wellness and has as such become a key performance indicator in quality systems.[16] While a high level of job satisfaction is associated with positive outcomes, doctors' job discontent may become a threat to the quality of patient care and safety, on an individual level as well as on a system level.[17-21]

Doctors' job satisfaction is related to work load, healthcare organization and management, professional autonomy, the ability to provide high quality health care, and financial systems including personal income.[22-25] The impact of changes in health politics and health care reforms has been insufficiently explored.

Several organizational reforms have been introduced in Norwegian health care during the first two decades of the 21st century. A coordination reform from 2012 to improve the collaboration between specialist (secondary) and municipal (primary) health care levels has laid more responsibility for patients on the local communities. This has resulted in an increased workload on general practitioners.[26] More duties for primary care has not been compensated by corresponding strengthening in resources and staffing, and a need for more GPs and a revision of the funding system has recently been voiced.[27]

This paper reports the development of job satisfaction among Norwegian doctors from 2010 to 2016-17 with special emphasize on general practitioners and a possible effect of the latest reforms.

MATERIALS AND METHODS

Participants and ethical approval

A reference panel of Norwegian doctors was established in 1994 by the Institute for Studies of the Medical Profession (LEFO, www.legeforsk.org). It constitutes approximately 1,600 practising doctors who have agreed to answer postal questionnaires every second year. Doctors who leave the panel, usually due to retirement, are replaced by young doctors, and the sample's representative structure is maintained.[28 29] This article is mainly based on data from 2010, 2012, 2014 (partly in 2015) and 2016 (partly in 2017).

Exemption from ethical approval for each repeated survey is granted from the Regional Committee for Medical Research Ethics (IRB 0000 1870).

Dependent variable

Job satisfaction was measured with a modified version of the "Job Satisfaction Scale" by Warr, Cook and Wall.[30] It consists of the following ten items scored on a Likert scale from 1 (very dissatisfied) to 7 (very satisfied):

How satisfied are you with:

(1) The amount of responsibility you are given

(2) Variation of work

(3) Your colleagues and fellow workers

(4) Your physical work conditions

(5) Your opportunities to use your skills

(6) Your overall job situation

(7) The freedom to choose your own methods of working

(8) The recognition you get for good achievements

(9) Your rate of pay

(10) Your work hours

A mean unweighted sum score ranging from 1 to 7 is calculated.

Independent variables

J*ob positions* have been categorised into the following groups:

(a) Doctors in hospital: doctors in management positions (medical superintendent, head of department, chief senior consultant, head of unit, senior consultant, head of section), senior hospital consultants and specialty registrars.

(b) General practitioners

(c) Specialists working in private practice

(d) Doctors in academia: professor, associate professor, research fellow, and researcher

(e) Community medical officers: district medical officer, senior district medical, officer, nursing home medical officer, visiting medical officer, doctor at infant welfare clinic, community general practitioner

(f) Doctors in administrative positions: county medical officer, medical advisor, chief medical officer

(g) Other key job categories

Other independent variables were *gender* and *age.*

Analysis

The distribution of JSS is close to normal (Kolmogorov-Smirnov test 0.56, $p < 0.001$) with a slightly negative skewness (-0.62). Thus the use of parametric tests is unproblematic. General Linear modelling (GLM) controlled for gender and age was used to estimate the means of job satisfaction at the four points in time: 2010, 2012, 2014, and 2016-17. Statistically significant differences are assumed when the 95% confidence intervals are not overlapping.

Paired t-tests are used to show individual differences between two points in time.

Since interns were only identified in data from 2016-17, this category is excluded in this paper.

Three different samples are analysed. The first consists of all respondents at all times. The second sample comprises doctors with defined job positions in one of four categories: GPs, specialists in private practice, hospital doctors or doctors in academia in minimum one survey. The third, *longitudinal* sample are the doctors who responded at all four points in time. A subsample here are the doctors who did not change job position during the observational period.

Units with missing data were excluded. Predictive Analytics Software Statistics 25 was used for the analyses.

Patient and public involvement

No patients were involved in setting the research question or the outcome measures, nor were they involved in the design and implementation of the study. There are no plans to involve patients in dissemination.

RESULTS

Respondents

Table 1 shows the sample, number of respondents, response rates and the makeup of job positions for which we have data on JSS, gender and age: 946 in 2010, 1161 in 2012, 1056 in 2014 and 1290 in 2016-17. The majority of respondents worked in hospitals.

Table 1

The proportion of females increased from 37.4% (95 % CI 34.3 to 40.5) in 2010, to 43.4% (40.6 to 46.3) in 2012, was 42.5% (39.5 to 45.5) in 2014 and increased further to 52.9% (50.3 to 55.5) in 2016-

17. The mean age was 50.7 (95% CI 49.9 to 51.6) years in 2010, 49.7 (48.9 to 50.4) years in 2012, 50.5 (49.7 to 51.3) years in 2014 and 47.7 (46.9 to 48.4) years in 2016-17.

The representativity of the data for 2010, 2012 and 2014 is described elsewhere.[29] Data for 2016-17 are comparable with the Norwegian doctors workforce in 2016 regarding age, gender and job positions, but with a slightly higher percentage of females, and doctors in academia (data not shown).

548 doctors responded at all four time points, 202 (37%) females. Mean age in 2010 was 48.1 years. 64.8% (355/548) were stable in their jobs over the period: 233 hospital doctors, 94 GPs, 22 private practice specialists and 6 doctors in academia. Due to the low number of doctors in academia, this group is excluded in some of the analyses.

Changes in job satisfaction

All doctors

The estimated mean of job satisfaction, controlled for gender, age and job position for all respondents in 2016-17, was 5.30, (95% CI 5.22 to 5.38), which is significantly lower than in 2010 (5.52, 5.42 to 5.61), and nearly significant in 2012 (5.45, 5.37 to 5.54) and 2014 (5.44, 5.35 to 5.53).

Doctors in different job positions

Over the whole period, the mean score of job satisfaction decreased for GPs and for hospital doctors. Private practice specialists were the most satisfied, while hospital doctors were least satisfied. No differences were found between GPs and doctors in academia. Job satisfaction generally increased from 2012 to 2014 and decreased from 2014 to 2016-17 for GPs, private practice specialists and hospital doctors. In 2016-17, GPs reported significantly higher satisfaction than hospital doctors, and significantly lower satisfaction than private practice specialists.

Figure 1 with table

From 2010 to 2016-17 there was a non-significant decrease in JSS for other job positions like community medical officers (5.59, 95% CI 5.26 to 5.91 vs. 5.33, 5.10 to 5.56), doctors in administration (5.75, 5.38 to 6.12 vs. 5.39, 5.08 to 5.71) and doctors in other positions (5.61, 5.32 to 5.89 vs. 5.23, 4.99 to 5.46).

Effect of age, gender and specialty on estimated means of JSS

There were no gender differences. JSS increased with increasing age. Among hospital doctors, JSS did not vary significantly over time across medical specialties (data not shown).

Changes in JSS in the longitudinal sample

All doctors

Using paired sample t-tests, JSS scores were found to increase non-significantly from 2010 to 2012 (5.30 vs. 5.34; t=1.43; p=0.152), to increase significantly from 2012 to 2014 (5.34 vs. 5.41; t=2.19; p=0.029) and to decrease significantly from 2014 to 2016-17 (5.41 vs. 5.34; t=-2.03; p=0.043).

Hospital doctors, GPs and private practice specialists

From 2010 to 2016-17, the JSS scores for GPs decreased steadily. For specialists in private practice and for hospital doctors it increased from 2010 to 2014, and decreased from 2014 to 2016-17. At any point in time, private practice specialists were the most satisfied. GPs were more satisfied than hospital doctors, but the difference between these groups decreased.

Figure 2

Changes on the item level

For GPs and doctors in hospital, the item scores on "freedom to choose methods", "recognition for good work", "rate of pay" and "work hours" decreased significantly from 2010 to 2016-17. Also, GPs reported significantly lower scores for "amount of responsibility" and "overall JSS". The same pattern

was found in the longitudinal sample, although not statistically significant. No significant changes on the item level were found for private practice specialists and for doctors in academia.

Table 3

DISCUSSION

Main findings

From 2010 to 2016-17, JSS remained high among Norwegian doctors, but with a decreasing trend. The decrease was statistically significant for GPs and for hospital doctors. Private practice specialists were most satisfied, followed by GPs and hospital doctors. The difference between the GPs and the private practice specialist increased over time. Of the ten JSS items "working hours", "payment", "recognition for good work" and "freedom to choose methods of work" declined significantly, both among GPs and hospital doctors, while no significant changes were found for specialists in private practice and doctors in academia.

Strengths and limitations

The study`s main strength is that it allows for generalisation to the whole population of doctors in Norway. Similarities in survey methods and repeated measures should also be pointed out. Furthermore, the response rates were fairly good, ranging from 67% and 75%, which are higher than for other surveys of the medical profession, but do not rule out the possibility of non-response bias.[29] However, analyses in Table 2 and 3 show no significant differences in the JSS scores between the longitudinal and the total sample. The Warr-Cook-Wall scale for job satisfaction was not specifically designed for doctors, but it has been validated[30] and used extensively in doctor populations both in Norway and elsewhere.[8-11 13 14]

Comparison with other studies

Differences in methodology limit direct comparisons with other studies. However, it is possible to point out some international trends in job satisfaction; older doctors report higher job satisfaction, and

there are no gender differences.[9 12 14 31] Age changes in satisfaction are related to the lowered expectations over time, higher remuneration, higher perceived autonomy and more experience.[13 32 33]

In Norway, JSS was stable and high from 1994 to 2002,[12] increased from 2000 to 2006,[13] and decreased from 2010 to 2016-17. However, it was still at a relatively high level in 2016-17 higher than in 2000, 2002, 2004 and lower than in 2006.[12] Longitudinal studies on doctors' job satisfaction are few and show a mixed pattern. A study on doctors` intention to work in the UK suggested a decrease in their satisfaction. The fraction of UK-trained doctors who would "probably not" or "definitely not" practice medicine in the UK increased from 8% in 1996-2011 to 15% in 2015.[3] Decreasing professional satisfaction were also described among doctors in the UK and US.[1 2 4] On the other hand, increased satisfaction with work has been reported from doctors in the Netherlands from 2000 to 2009[34] and from six graduation cohorts from 1996 to 2012 in the UK.[35] High levels of job satisfaction were documented from emergency medicine residents in the US,[36] family physicians in Canada,[37] primary care physicians in Germany,[38] and Australia.[39]

Norwegian studies show statistically significant higher job satisfaction for GPs than for hospital doctors from 2000 to 2006 and in 2008, and no significant differences between GPs and private practice specialist in 2008.[13 14] In our study, JSS decreased significantly for GPs and hospital doctors, but GPs continued with higher scores than their hospital colleagues. GPs and private practice specialists had similar levels of satisfaction in 2010, while the scores were significantly higher for private practice specialist in 2012, 2014 and 2016-17 (Figure 1 with table).

Decline in GPs job satisfaction seems to be the rule all over the world. A Danish study shows that the proportion of GPs reporting dissatisfaction with work increased from 6% in 2012 to 22% in 2016. Significant increase in dissatisfaction was found for "working hours", "rate of pay", "freedom to choose methods" and "recognition for good work".[6] The National GP Worklife Survey in the UK documents that satisfaction with "colleagues and fellow workers" improved, while the other nine aspects of job declined from 2010 to 2017. The largest decrease were "working hours", "rate of pay"

and "amount of responsibility".[5] The MABEL survey among doctors in Australia also shows a decline from 2013 to 2015 in GPs job satisfaction.[7]

According to a recent systematic review on satisfaction of doctors working in hospitals within the European Union, hospital doctors had a moderate job satisfaction; 4.81 on a scale from 1 to 7.[40] In our sample, doctors in hospital reported higher levels of satisfaction: 5.14 in 2010 and 5.00 in 2016-17.

In the Norwegian "Working environment and living conditions survey" top managers, farmers/fisherman or physiotherapists report a higher level and nurses, policeman or customer service occupations a lower level of satisfaction than the doctors.[41]

Explanation of results

Health care organisations and financial systems are constantly subject to change in most countries. Studies document that changes in the healthcare organisation may influence the doctors` work-life and professional satisfaction.[42 43] Two important reforms have been introduced in Norway in the beginning of the 21 century: "The Regular General Practitioners Scheme" in 2001 and "The Hospital Reform" in 2002. The Regular General Practitioners Scheme introduced a "list-patient" system whereby all inhabitants in Norway can voluntarily sign on to the list of a general practitioner of their choice. This reform aimed at enhancing access to general practitioners and continuity in the patient-doctor relationship. The implementation of the "list-patient" system has modified the structure of GPs` remuneration into a combination of government-funded capitation payment according to the number of patients on the list from the municipals, the fee-for-service from the National Insurance System and the direct payment of the patients. The Hospital Reform transferred the ownership of hospitals and specialist health services from the county level to the central government, and hospitals were organised as health enterprises. A previous study based on data from 2000 to 2006 showed that job satisfaction increased and that the comprehensive reforms in the Norwegian health-care system did not influence negatively the job satisfaction for all doctors and particularly for hospital doctors and GPs.[13]

Three new major health care reforms have been implemented over the last decade in Norway. "The Coordination Reform" in 2012, aims at better collaboration between primary (municipal) and secondary (specialist) health care services,[44] "The Free Choice of Hospital Reform" in 2015 gives the users a free choice of hospital,[45] and the white paper on "The Future Primary Care – Proximity and Comprehensiveness" in 2015 aiming to improve user involvement, availability, prevention, proactivity and collaboration between multidisciplinary teams.[46]

These reforms are challenging for the doctors, and may explain some of the reduction in satisfaction. Studies show that high professional autonomy yields better quality of health care and more doctor satisfaction.[25 47] More time spent on direct patient care and less time spent on administrative tasks, and optimal economic conditions in general are also important positive contributors to job satisfaction.[8 48 49] A study based on data from 1994 to 2014 shows that the total weekly working hours remained unchanged for most doctors in Norway, while time spent on direct patient care has decreased, particularly for hospital doctors.[29] Another study with data from 2018 documents long working weeks with a wide variety of tasks among GPs.[50] 70% of doctors experienced stress in association with perpetual reorganisations of the national health care system, particularly hospital doctors.[42] A recent survey on hospital doctors' working conditions documents that hospital doctors score high on items related to engagement at work, assessment of work as meaningful and cooperation with colleagues, but lower on items related to workload and professional autonomy (including openness, participation in decision making, dialogue with the hospital management).[51] In another recent survey on GPs` working conditions,[52] GPs reported that they have a meaningful job with various interesting tasks. However, they also reported considerable growth both in work demand and in cost of running their own medical office during the last decade. The high work demand were related to increased transfer of tasks that were previously conducted by outpatient clinics or hospitals, for example follow-up care of pregnant women or patients with chronic diseases like cancer, rheumatic diseases, endocrinological disease, substance abuse or some mental health disorders. In addition, there were increases in consultations, laboratory services for appointment specialists, tasks related to preventive treatment and documentation as well as certification requirements.[52 53]

These findings fit well with our data where several aspects of satisfaction declined significantly. For GPs, the largest decrease was in "amount of responsibility given" followed by "work hours", "recognition for good clinical work", "rate of pay", "overall job satisfaction", and "freedom to choose methods of work". For hospital doctors, the decrease was largest in "freedom to choose methods of work" followed by "rate of pay", "recognition for good clinical work" and "work hours". The high job satisfaction of specialists in private practice probably reflects both professional and time-based autonomy and good economic conditions.

In the longitudinal sample (the doctors who responded at all four points in time), there were no significant changes neither on the item level nor on estimated JSS from 2010 to 2016-17 (Table 3). A common tendency for GPs, hospital doctors and private practice specialist was a non-significant decrease in job satisfaction from 2014 to 2016-17 (Figure 2). Possible reasons for this stability in JSS may be a combination of the *adaption* of health care regulations over time and the *selection* of doctors. The most satisfied doctors are more likely to remain in their current job position.

Changes in professional culture may also explain some of the reduced satisfaction. In a study among hospital doctors in Norway, many senior consultants talked about "being a doctor" as a major part of their "identity" and "lifestyle", while the specialty registrars were more likely to regard their work as a "job".[54] In another study, most doctors were satisfied as doctors, but felt it challenging to combine the job with leisure activities and family life. Some senior consultants were of the opinion that specialty registrars were less willing to prioritize professional life and more concerned with their responsibilities outside of work.[55]

The slightly increasing trend in job satisfaction among all Norwegian doctors described from 2000 to 2006[13] did not continue from 2010 to 2016-17. However, the job satisfaction level was still above 5 on a 1 to 7 scale. In surveys from 2018, GPs and hospital doctors described their work as meaningful in

spite of considerable work overload.[51 52] This suggests that job satisfaction is also based on internal values. To be in demand and to treat patients were also fundamental elements of doctor satisfaction.[56]

Policy implications and future research

The importance of a good professional climate is emphasized in both Norwegian and European working conditions legislature.[57 58] Job satisfaction for Norwegian doctors remained relatively high, but with a downward trend over an eight year period, where the decrease was statistically significant for GPs and hospital doctors. Variations in job satisfaction across job positions call for more separate analyses. High job satisfaction among doctors is important. It has been found to relate positively to doctors well-being and quality of health care.[17-19 43] In addition, job satisfaction is an important factor for career decision like staying in or leaving the current job position.[59] Low recruitment to primary care is a concurrent issue in media,[60] health administration[61] and research,[27 62] therefore better job satisfaction is important. This could be achieved through regulation of working hours, improvement of recognition for medical work regarding payment and feedback for good work.

Declarations

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Contributors JR, OGA and MN designed the study. JR undertook the literature review, did the statistical analysis and wrote the first draft. OGA and MN made critical revisions. All authors had full access to all of the data (including statistical reports and tables) and are jointly responsible for the integrity of the data and the accuracy of the data analysis.

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Competing interest None declared.

Ethics approval According to the Regional Committee for Medical Research Ethics, the study based on "Norwegian Physician Survey - A bi-annual prospective questionnaire survey to a representative sample of Norwegian physicians" is exempt from review in Norway, cf. §§ 4 of The Act. The project can be implemented without the approval by the Regional Committee for Medical Research Ethics (IRB 0000 1870). Additionally, approval for data protection of the bi-annual prospective survey among Norwegian doctors was obtained from the Norwegian Social Science Data Service (Reference 19521).

Data sharing statement The authors may be able to provide aggregated data on which the analysis is based, on request. No additional data available.

Patient consent N/A

STROBE Statement: The authors confirm that they have followed the list of the STROBE Statement **(**BMJ 2007;335:806-808).

Transparency declaration: The lead author (Judith Rosta) affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

Figure legends

Figure 1 GLM on estimated means of job satisfaction (scored from 1 to 7) controlled for age and gender among doctors in different type of work in 2010, 2012, 2014 and 2016-17.

Figure 2 Paired t-test on changes of estimated means of job satisfaction (scored from 1 to 7) among doctors in different type of work that responded at all four time points

Table to Figure 1

Please do insert table after the Figure 1.

	2010 mean (95 % CI)	2012 mean (95 % CI)	2014 mean (95 % CI)	2016-17 mean (95 % CI)
General practitioners	5.54 (5.43-5.65)	5.33 (5.23-5.44)	5.43 (5.31-5.54)	5.17 (5.07-5.28)
Doctors in hospital	5.14 (5.07-5.21)	5.06 (5.00-5.12)	5.16 (5.09-5.23)	5.00 (4.94-5.06)
Specialists in private practice	5.64 (5.42-5.86)	5.74 (5.52-5.95)	5.81 (5.59-6.03)	5.53 (5.29-5.77)
Doctors in academia	5.35 (5.14-5.56)	5.50 (5.30-5.70)	5.34 (5.12-5.55)	5.45 (5.23-5.66)

Table 1 **Sample, number of respondents, response rates and the makeup of job categories for respondents where we have data on job satisfaction, gender and age.**

	Sample (n)	Respondents[a] (n)	Response rate (%)	Job categories (n)							
				All[b]	Doctors in hospital	General practitioners	Specialists in private practice	Doctors in academia	Community medical officers	Doctors in administrative position	Other job categories
2010	1 520	1 014	66.7	946	534	219	57	61	24	19	32
2012	1 792	1 279	71.4	1 161	678	257	60	67	38	30	31
2014	1 545	1 158	75.0	1 056	617	223	60	60	38	28	30
2016-17	2 195	1 604	73.1	1 290	772	263	52	64	55	30	54

(a) Number of respondents with no data on job satisfaction or gender or age or job position were 68 in 2010, 118 in 2012, 102 in 2014 and 147 in 2016-17.

(b) Since interns were only identified in data 2016-17 (n=167), this category is excluded in this paper.

Table 2 **GLM on estimated means, controlled for gender and age, of the 10 job satisfaction scale items (each scored from 1 to 7) among doctors in different type of work in 2010 and 2016/17. Statistically significant differences (95% CI does not overlap) are in bold.**

	General practitioners means (95 % CI)		Doctors in hospital means (95 % CI)		Specialists in private practice means (95 % CI)		Doctors in academia means (95 % CI)	
Satisfied with ….	2010 (n=219)	2016-17 (n=263)	2010 (n=534)	2016-17 (n=772)	2010 (n=57)	2016-17 (=52)	2010 (n=61)	2016-17 (n=64)
Amount of responsibility given	**5.36 (5.19-5.53)**	**4.73 (4.57-4.90)**	5.28 (5.17-5.38)	5.19 (5.09-5.29)	5.78 (5.44-6.10)	5.65 (5.28-6.03)	5.81 (5.49-6.12)	5.75 (5.41-6.08)
Variation in work	5.80 (5.65-5.95)	5.60 (5.45-5.75)	5.40 (5.30-5.50)	5.25 (5.16-5.34)	5.30 (5.00-5.60)	5.16 (4.82-5.51)	5.76 (5.48-6.05)	5.50 (5.19-5.80)
Colleagues and fellow workers	5.90 (5.76-6.05)	5.73 (5.58-5.87)	5.56 (5.47-5.65)	5.69 (5.60-5.77)	5.63 (5.34-5.91)	5.46 (5.13-5.79)	5.44 (5.18-5.71)	5.49 (5.19-5.78)
Physical working conditions	5.60 (5.43-5.77)	5.47 (5.31-5.64)	4.81 (4.70-4.92)	4.77 (4.67-4.87)	5.52 (5.18-5.86)	5.32 (4.95-5.69)	4.76 (4.44-5.09)	5.15 (4.82-5.48)
Opportunities to use abilities	5.90 (5.75-6.05)	5.62 (5.47-5.77)	5.46 (5.36-5.56)	5.36 (5.28-5.45)	5.79 (5.50-6.09)	5.74 (5.40-6.08)	6.10 (5.82-6.38)	5.93 (5.62-6.23)
Overall job satisfaction	**5.88 (5.74-6.01)**	**5.49 (5.35-5.63)**	5.51 (5.42-5.60)	5.40 (5.32-5.48)	5.94 (5.66-6.21)	5.86 (5.55-6.17)	5.84 (5.58-6.10)	5.78 (5.50-6.06)
Freedom to choose method of work	**5.66 (5.50-5.82)**	**5.34 (5.18-5.49)**	**4.97 (4.87-5.07)**	**4.67 (4.58-4.76)**	5.90 (5.59-6.22)	5.70 (5.35-6.05)	5.73 (5.43-6.03)	5.67 (5.36-5.99)
Recognition for good work	**5.38 (5.20-5.55)**	**4.83 (4.66-5.01)**	**4.82 (4.71-4.94)**	**4.59 (4.49-4.69)**	5.50 (5.14-5.85)	5.41 (5.01-5.81)	5.26 (4.92-5.59)	5.20 (4.84-5.55)
Rate of pay	**5.40 (5.23-5.57)**	**4.92 (4.75-5.09)**	**4.94 (4.83-5.05)**	**4.68 (4.58-4.77)**	5.66 (5.32-6.00)	5.67 (5.29-6.04)	3.94 (3.62-4.27)	4.51 (4.17-4.85)
Work hours	**4.56 (4.37-4.74)**	**4.00 (3.82-4.18)**	**4.61 (4.49-4.73)**	**4.38 (4.27-4.48)**	5.41 (5.04-5.78)	5.34 (4.93-5.75)	4.86 (4.50-5.21)	5.49 (5.13-5.86)
JSS	**5.54 (5.43-5.65)**	**5.17 (5.07-5.28)**	**5.14 (5.07-5.21)**	**5.00 (4.94-5.06)**	5.64 (5.42-5.86)	5.53 (5.29-5.77)	5.35 (5.14-5.56)	5.45 (5.23-5.66)

Table 3 **GLM on estimated means, controlled for gender and age, of the ten JSS items (each scored from 1 to 7) among doctors in different type of work in the longitudinal sample in 2010 and 2016/17. Statistically significant differences (95% CI do not overlap) are in bold.**

	General practitioners means (95 % CI)		**Specialists in private practice** means (95 % CI)		**Doctors in hospital** means (95 % CI)	
Satisfied with ….	2010 (n=94)	2016-17 (n=94)	2010 (n=233)	2016-17 (n=233)	2010 (n=22)	2016-17 (n=22)
Amount of responsibility given	5.35 (5.09-5.61)	4.87 (4.57-5.18)	5.35 (5.20-5.50)	5.21 (5.03-5.39)	5.96 (5.55-6.36)	5.82 (5.18-6.46)
Variation in work	5.84 (5.61-6.07)	5.92 (5.73-6.10)	5.41 (5.27-5.55)	5.44 (5.29-5.59)	5.05 (4.91-5.48)	5.27 (4.72-5.83)
Colleagues and fellow workers	5.95 (5.74-6.16)	5.87 (5.67-6.08)	5.63 (5.50-5.77)	5.58 (5.54-5.82)	5.73 (5.32-6.13)	5.68 (4.99-6.37)
Physical working conditions	5.68 (5.46-5.90)	5.70 (5.48-5.93)	4.75 (4.58-4.92)	4.90 (4.73-5.06)	5.86 (5.38-6.35)	5.91 (5.35-6.47)
Opportunities to use abilities	5.87 (5.65-6.10)	6.03 (5.85-6.21)	5.52 (5.38-5.65)	5.56 (5.40-5.71)	5.77 (5.42-6.12)	6.14 (5.53-6.74)
Overall job satisfaction	5.95 (5.77-6.13)	5.70 (5.51-5.90)	6.05 (5.70-6.40)	5.96 (5.35-6.56)	5.54 (5.42-5.66)	5.44 (5.30-5.58)
Freedom to choose method of work	5.75 (5.55-5.95)	5.48 (5.27-5.69)	6.05 (5.63-6.46)	5.91 (5.30-6.52)	4.98 (4.82-5.14)	4.96 (4.80-5.13)
Recognition for good work	5.40 (5.16-5.65)	5.15 (4.89-5.41)	5.50 (5.09-5.92)	5.77 (5.20-6.34)	4.91 (4.74-5.09)	4.79 (4.61-4.98)
Rate of pay	5.47 (5.24-5.70)	5.16 (4.90-5.42)	5.91 (5.52-6.30)	6.00 (5.44-6.56)	4.97 (4.79-5.14)	4.90 (4.74-5.06)
Work hours	4.49 (4.19-4.79)	3.92 (3.59-4.24)	5.46 (4.89-6.02)	5.63 (5.04-6.24)	4.52 (4.34-4.70)	4.48 (4.30-4.76)
JSS	5.58 (5.42-5.73)	5.38 (5.23-5.53)	5.73 (5.52-5.95)	5.81 (5.32-6.30)	5.16 (5.06-5.26)	5.14 (5.03-5.25)

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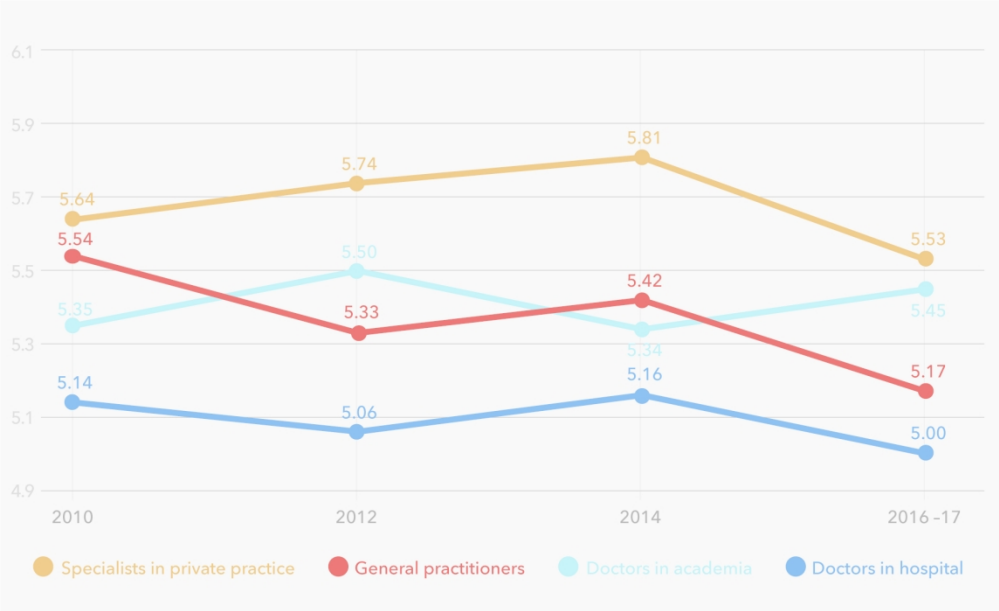
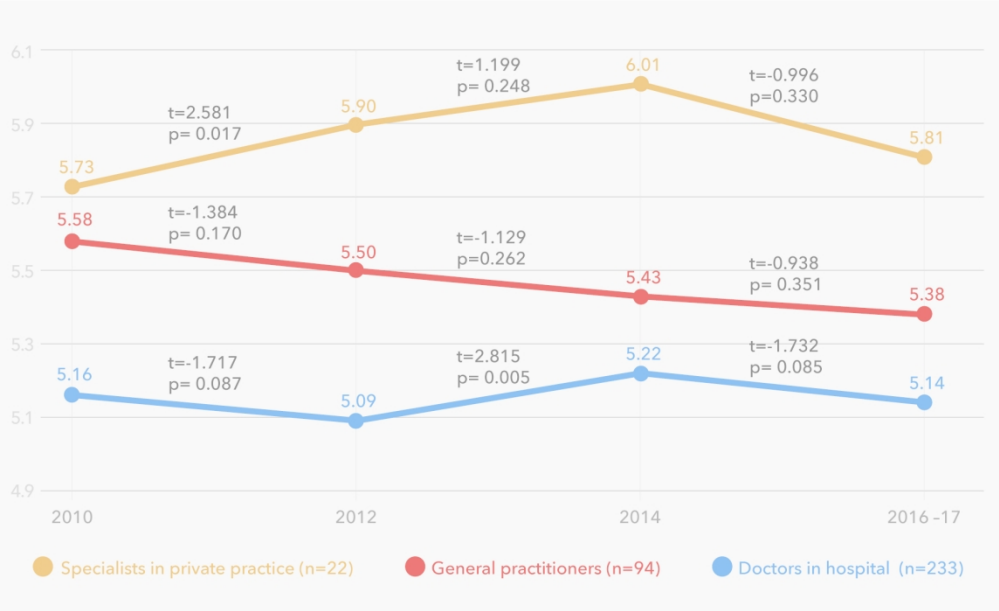


GLM on estimated means of job satisfaction (scored from 1 to 7) controlled for age and gender among doctors in different type of work in 2010, 2012, 2014 and 2016-17.



Paired t-test on changes of estimated means of job satisfaction (scored from 1 to 7) among doctors in different type of work that responded at all four time points

STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*
Checklist for cohort, case-control, and cross-sectional studies (combined)

Norwegian doctors still happy? Job satisfaction among Norwegian doctors 2010 – 2017 based on repeated surveys
Judith ROSTA, Olaf G. AASLAND, Magne NYLENNA

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any pre-specified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	5
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	10
Study size	10	Explain how the study size was arrived at	5 and Table 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6-7
		(*b*) Describe any methods used to examine subgroups and interactions	6-7
		(*c*) Explain how missing data were addressed	7

		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7 and Table 1
		(b) Give reasons for non-participation at each stage	7 and Table 1
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8
		(b) Indicate number of participants with missing data for each variable of interest	7 and Table 1
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	N/A
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	N/A
		Cross-sectional study—Report numbers of outcome events or summary measures	8-9
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	8-9 and Figure 1 and 2
		(*b*) Report category boundaries when continuous variables were categorized	N/A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9-10 and Table 2, 3
Discussion			
Key results	18	Summarise key results with reference to study objectives	10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	10
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	12-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	10-12
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	N/A

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Changes in job satisfaction among doctors in Norway from 2010 to 2017.A study based on repeated surveys

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Changes in job satisfaction among doctors in Norway from 2010 to 2017. A study based on repeated surveys

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ABSTRACT

OBJECTIVE

To assess job satisfaction for different categories of Norwegian doctors from 2010 to 2016-17.

DESIGN

Cross sectional surveys in 2010, 2012, 2014 and 2016-17 of partly overlapping samples.

SETTING

Norway from 2010 to 2016-17.

PARTICIPANTS

Doctors working in different job positions (hospital doctors, GPs, private practice specialists, doctors in academia). Response rates were 67% (1014/1520) in 2010, 71% (1279/1792) in 2012, 75% (1158/1545) in 2014 and 73% (1604/2195) in 2016-17. The same 548 doctors responded at all four points in time.

MAIN OUTCOME MEASURE

Job Satisfaction Scale (JSS), a 10-item widely used instrument, with scores ranging from 1 (low satisfaction) to 7 (high satisfaction) for each item, and an unweighted mean total sum score.

ANALYSIS

GLM, controlling for gender and age, and paired t-tests.

RESULTS

For all doctors, the mean scores of JSS decreased significantly from 5.52 (95% confidence interval 5.42 to 5.61) in 2010 to 5.30 (5.22 to 5.38) in 2016-17. The decrease was significant for GPs (5.54, 5.43 to 5.65 vs. 5.17, 5.07 to 5.28) and hospital doctors (5.14, 5.07 to 5.21 vs. 5.00, 4.94 to 5.06). Private practice specialists were most satisfied, followed by GPs and hospital doctors. The difference between the GPs and the private practice specialists increased over time.

CONCLUSIONS

From 2010 to 2016-17 job satisfaction for Norwegian doctors decreased, but it was still at a relatively high level. Several health care reforms and regulations over the last decade and changes in the professional culture may explain some of the reduced satisfaction.

KEYWORDS: Job satisfaction, doctors, Norway, repeated surveys

Strengths and limitations of the study

The surveys had high response rates.

The data allowed for generalisation to the whole doctor workforce in Norway.

There were similarities in survey methods and measurements at all four points in time.

The ten item version of the Warr-Cook-Wall scale for job satisfaction was specifically modified for GPs in the UK, but it has been used extensively in doctor populations both in Norway and elsewhere.

Analyses were based on self-reported questionnaire data with the possibility of both over- and underestimation.

INTRODUCTION

Job satisfaction is important both for individual employees and organisations. It is linked to employees` productivity,[1] absenteeism,[2] turnover,[3] physical and mental health and well-being.[3-6]

For doctors, wellness is crucial to the delivery of good health care and has been identified as a missing quality indicator.[7] Satisfaction is a substantial element of professional wellness and has as such become a key performance indicator in quality systems.[8] While a high level of job satisfaction is associated with positive outcomes, doctors' job discontent may become a threat to the quality of patient care and safety, on an individual as well as on a system level.[9-14]

Doctors' job satisfaction is related to work load, healthcare organization and management, professional autonomy, the ability to provide high quality health care, and financial systems including personal income.[14-19]

Two important reforms were introduced in Norway at the beginning of the 21 century: "The Regular General Practitioners Scheme" in 2001 and "The Hospital Reform" in 2002. The Regular General Practitioners Scheme introduced a list-patient system whereby all inhabitants in Norway have their assigned general practitioner. This reform aimed at enhancing access to general practitioners and continuity in the patient-doctor relationship. The implementation of the list-patient system has modified the structure of GPs` remuneration into a combination of three sources: capitation based payment from the local government, fee-for-service payment from NAV (the National Insurance System) and out-of-pocket payments from patients. The Hospital Reform transferred the ownership of hospitals and specialist health services from the county to the state level, organised through central and local health enterprises.

Previous studies showed that the satisfaction level among doctors in Norway was stable and high from 1994 to 2002[20] and even increased from 2000 to 2006.[21] General practitioners and private practice

specialists were generally more satisfied than hospital doctors.[21 22] The above mentioned comprehensive reforms did not have any detectable positive or negative impact on the job satisfaction of neither hospital doctors nor GPs,[21] as opposed to an international negative trend.[23-27] The satisfaction level of doctors in Norway was higher than in comparable countries like Germany,[28 29] Iceland[30] and the US.[19]

Three new organizational reforms have also been introduced in Norwegian health care over the last decade. "The Coordination Reform" from 2012 intended to improve the collaboration between specialist (secondary) and municipal (primary) health care levels by placing more responsibility for individual patients on the local community. This has resulted in an increased workload on the general practitioners,[31 32] which so far has not been compensated by a corresponding strengthening in resources and staffing.[33] "The Free Choice of Hospital Reform" in 2015 gave the users a free choice of hospital,[34] and the white paper on "The Future Primary Care – Proximity and Comprehensiveness" in 2015, which aimed to improve user involvement, availability, prevention, proactivity and collaboration between multidisciplinary teams.[35] The impact of these reforms on doctors' job satisfaction has so far been insufficiently explored.

There are several instruments to measure job satisfaction, including single items and multi-item scales.[6 36 37] A widely used instrument in health care settings is the ten item version[38] of the Warr-Cook-Wall job satisfaction scale (JSS),[6] assessing both total job satisfaction and satisfaction with different aspects of the job.[19-21 26 28-30 38-40] It also allows for good national and international comparisons.

This paper reports the development of job satisfaction among Norwegian doctors from 2010 to 2016-17 with special emphasis on general practitioners and a possible effect of the latest reforms.

MATERIALS AND METHODS

Design and participants

Since 1994 the Institute for Studies of the Medical Profession (LEFO, www.legeforsk.org) has regularly surveyed a representative panel of active Norwegian doctors biannually with postal questionnaires. The original panel was based on an invitation to 2,000 randomly selected active Norwegian doctors in 1993. The 1,272 doctors who agreed to participate were representative of the total doctor work force in terms of age, sex, specialty and place of work. Since then approximately 540 doctors have left the panel due to retirement, death, or voluntary withdrawal. Therefore, the panel was supplemented with approximately 400 young doctors in 2000, 250 young doctors in 2008, 300 in 2012 and 650 doctors in 2016-17, maintaining the representativity.[41 42] With this in and out pattern our cohort constitutes what may be called an unbalanced cohort.

This article is based on data from 2010, 2012, 2014 (partly in 2015) and 2016 (partly in 2017).

Inclusion and exclusion criteria

Since interns were only identified in data from 2016-17, this category is excluded in this paper.

Ethical approval

According to the Regional Committee for Medical Research Ethics, the study based on “Norwegian Physician Survey - A bi-annual prospective questionnaire survey to a representative sample of Norwegian physicians” is exempt from review in Norway, cf. §§ 4 of The Act. The project can be implemented without the approval by the Regional Committee for Medical Research Ethics (IRB 0000 1870). All invitees received a letter with a description of the "Norwegian Physician Survey" aim. It was also explained that the participation is voluntary and the data would be handled confidentially. All participants signed informed written consent before the start of the survey.

Dependent variable

Total job satisfaction and *satisfaction with different aspect of the job* were measured with the ten item version[38] of the "Job Satisfaction Scale" by Warr, Cook and Wall.[6]

The original scale included one item assessing the overall satisfaction and fifteen items assessing two factors related to job satisfaction, the intrinsic factor (seven items on attitudes towards personal achievement and task success: freedom to choose your own method of working, recognition you get for good work, the amount of responsibility you are given, your opportunity to use your abilities, your chance of promotion, the attention payed to suggestions you make, the amount of variety in your job) and extrinsic factor (eight items on attitudes on working conditions: physical working conditions, your fellow workers, your immediate boss, your rate of pay, industrial relations between management and workers in your firm, the way your firm is managed, your hours of work, your job security). The total job satisfaction was calculated as the sum of all separate items. The scale was tested for validity and reliability in blue-collar male workers employed full-time in a manufactural industry in the United Kingdom.[6]

The ten item form of the original scale was devised by Cooper-Rout-Faragher in 1989 to study job satisfaction, mental health and stress among general practitioners in England. Five items were removed from the original scale that were not relevant for the general practitioners population: "your immediate boss", "industrial relations between management and workers in your firm", "your chance of promotion", "the way your firm is managed" and "your job security". The scale was not tested for validity and reliability by Cooper, Rout and Faragher.[38] A validation study of this scale was done in a cohort of Australian clinical medical workforce by Hills, Joyce and Humphries in 2012, where the original seven point Likert scale was reduced to five point Likert scale from 0 (very dissatisfied) to 4 (very satisfied). Factor analytic and internal reliability tests did not support differentiating intrinsic and extrinsic factors. They supported the use of the ten item instrument as a single-factor scale and the use of a composite job satisfaction score.[43]

The ten item version[38] of the original Warr-Cook-Wall questionnaire with seven point Likert scale[6] was used extensively in doctors population in Norway and elsewhere.[19-22 26 28-30 39 40] We applied this instrument in our study to allow comparisons across countries and over time. The ten item were:

How satisfied are you with:

(1) The amount of responsibility you are given

(2) Variation of work

(3) Your colleagues and fellow workers

(4) Your physical work conditions

(5) Your opportunities to use your skills

(6) Your overall job situation

(7) The freedom to choose your own methods of working

(8) The recognition you get for good achievements

(9) Your rate of pay

(10) Your work hours

We asked the doctors to score each of the ten items on a seven point Likert scale from 1 (very dissatisfied) to 7 (very satisfied). An unweighted mean sum score was calculated, as well as analyses of single items.

Independent variables

There are several possible job positions for doctors in Norway. For the purpose of this study, they are collapsed into the following seven categories:

(a) Doctors in hospital: doctors in management positions (medical superintendent, head of department, chief senior consultant, head of unit, senior consultant, head of section), senior hospital consultants and specialty registrars

(b) General practitioners

(c) Specialists working in private practice

(d) Doctors in academia: professor, associate professor, research fellow, and researcher

(e) Community medical officers: district medical officer, senior district medical officer, nursing home medical officer, visiting medical officer, doctor at infant welfare clinic, community general practitioner

(f) Doctors in administrative positions: county medical officer, medical advisor, chief medical officer

(g) Other key job categories

Other independent variables were *gender* and *age.*

Analysis

The distribution of JSS was close to normal (Kolmogorov-Smirnov test 0.56, $p < 0.001$) with a slightly negative skewness (-0.62). Thus the use of parametric tests was unproblematic. General Linear modelling (GLM) controlled for gender and age was used to estimate the means of job satisfaction at the four points in time: 2010, 2012, 2014, and 2016-17. Statistically significant differences were assumed when the 95% confidence intervals were not overlapping.

Paired t-tests were used to show individual differences between two points in time.

Three different samples were analysed. The first consisted of all respondents at all times, the *unbalanced cohort*. Here respondents with missing data on gender or age or all JSS items were excluded. The second sample comprised doctors with defined job positions in one of four categories: GPs, specialists in private practice, hospital doctors, and doctors in academia in minimum one survey. The third, *longitudinal* sample were the doctors who responded at all four points in time. A subsample here were the doctors who did not change job position during the observational period.

Predictive Analytics Software Statistics 25 was used for the analyses.

Patient and public involvement

No patients were involved in setting the research questions or the outcome measures, nor were they involved in the design and implementation of the study. There are no plans to involve patients in dissemination.

RESULTS

Respondents

Table 1 shows the sample, number of respondents, response rates and the makeup of job positions for which we have data on JSS, gender and age: 948 in 2010, 1164 in 2012, 1057 in 2014 and 1290 in 2016-17. The majority of respondents worked in hospitals.

Table 1

The proportion of females increased from 37.4% (95 % CI 34.3 to 40.5) in 2010, to 43.4% (40.6 to 46.3) in 2012, was 42.5% (39.5 to 45.5) in 2014 and increased further to 52.9% (50.3 to 55.5) in 2016-17. The mean age was 50.7 (95% CI 49.9 to 51.6) years in 2010, 49.7 (48.9 to 50.4) years in 2012, 50.5 (49.7 to 51.3) years in 2014 and 47.7 (46.9 to 48.4) years in 2016-17.

The representativity of the data for 2010, 2012 and 2014 is described elsewhere.[42] Data for 2016-17 are comparable with the Norwegian doctor workforce in 2016-17 regarding age, but with a slightly higher percentage of females, and doctors in academia (data not shown). The distribution of doctors in different job positions are comparable over the study period (Table 1).

548 doctors responded at all four time points, 202 (37%) females. Mean age in 2010 was 48.1 years. 64.8% (355/548) were stable in their jobs over the period: 233 hospital doctors, 94 GPs, 22 private practice specialists and 6 doctors in academia. Due to the low number of doctors in academia, this group is excluded in some of the analyses.

Changes in job satisfaction

All doctors

The estimated mean of job satisfaction, controlled for gender, age and job position for all respondents in 2016-17, was 5.30, (95% CI 5.22 to 5.38), which is significantly lower than in 2010 (5.52, 5.42 to 5.61), and non-significantly different from 2012 (5.45, 5.37 to 5.54) and 2014 (5.44, 5.35 to 5.53).

Doctors in different job positions

Over the whole period, the mean score of job satisfaction decreased for GPs and for hospital doctors. Private practice specialists were the most satisfied, while hospital doctors were least satisfied. No differences were found between GPs and doctors in academia. Job satisfaction generally increased from 2012 to 2014 and decreased from 2014 to 2016-17 for GPs, private practice specialists and hospital doctors. In 2016-17, GPs reported significantly higher satisfaction than hospital doctors, and significantly lower satisfaction than private practice specialists.

Figure 1 with table

From 2010 to 2016-17 there was a non-significant change in JSS for other job positions such as community medical officers (5.59, 95% CI 5.26 to 5.91 vs. 5.33, 5.10 to 5.56), doctors in administration (5.75, 5.38 to 6.12 vs. 5.39, 5.08 to 5.71) and doctors in other positions (5.61, 5.32 to 5.89 vs. 5.23, 4.99 to 5.46).

Effect of age, gender and specialty on estimated means of JSS

There were no gender differences. JSS increased with increasing age. Among hospital doctors, JSS did not vary significantly over time across medical specialties (data not shown).

Changes in JSS in the longitudinal sample

All doctors

Using paired sample t-tests, JSS scores were found to change non-significantly from 2010 to 2012 (5.30 vs. 5.34; t=1.43; p=0.152), to increase significantly from 2012 to 2014 (5.34 vs. 5.41; t=2.19; p=0.029) and then to decrease significantly from 2014 to 2016-17 (5.41 vs. 5.34; t=-2.03; p=0.043).

Hospital doctors, GPs and private practice specialists

From 2010 to 2016-17 in the longitudinal subsample, the JSS scores for GPs decreased steadily. A significant increase in JSS was found for specialists in private practice from 2010 to 2012, and for hospital doctors from 2012 to 2014. For all three job positions, there was a non-significant decline in JSS from 2014 to 2016-17. At any point in time, private practice specialists were the most satisfied. GPs were more satisfied than hospital doctors, but the difference between these groups decreased.

Figure 2

Changes on the item level

For GPs and doctors in hospital, the item scores on "freedom to choose methods", "recognition for good work", "rate of pay" and "work hours" decreased significantly from 2010 to 2016-17. Also, GPs reported significantly lower scores for "amount of responsibility" and "overall JSS". No significant changes on the item level were found for private practice specialists and for doctors in academia.

Table 2

The same pattern was found in the longitudinal subsample for GPs and hospital doctors, although not statistically significant.

Table 3

DISCUSSION

Main findings

From 2010 to 2016-17, JSS for all doctors decreased significantly. The decrease was statistically significant for GPs and for hospital doctors. Private practice specialists were most satisfied, followed by GPs and hospital doctors. The difference between the GPs and the private practice specialist increased over time. Of the ten JSS items "working hours", "payment", "recognition for good work" and "freedom to choose methods of work" declined significantly, both among GPs and hospital doctors, while no significant changes were found for specialists in private practice and doctors in academia (Table 2, Figure 1). In the longitudinal subsample, there was a non-significant decline in JSS for GPs, hospital doctors and private practice specialists from 2014 to 2016-17 (Figure 2).

Comparison with other studies

Differences in methodology limit direct comparisons with other studies. However, it is possible to point out some international trends in job satisfaction; older doctors report higher job satisfaction, and there are no gender differences.[20 22 29 39] Age changes in satisfaction are related to the lowered expectations over time, higher remuneration, higher perceived autonomy and more experience.[21 44 45]

In Norway, JSS was stable and high from 1994 to 2002,[20] increased from 2000 to 2006,[21] and decreased from 2010 to 2016-17. However, it was still at a relatively high level in 2016-17, higher than in 2000, 2002, 2004 and lower than in 2006.[20] Longitudinal studies on doctors' job satisfaction are few and show a mixed pattern. A study on doctors` intention to work in the UK suggested a decrease in their satisfaction. The fraction of UK-trained doctors who would "probably not" or "definitely not" practice medicine in the UK increased from 8% in 1996-2011 to 15% in 2015.[23] Decreasing professional satisfaction were also described among doctors in the US.[24] On the other hand, increased satisfaction with work has been reported from doctors in the Netherlands from 2000 to 2009[46] and from six graduation cohorts from 1996 to 2012 in the UK.[47] High levels of job satisfaction were documented from emergency medicine residents in the US,[48] family physicians in Canada,[49] primary care physicians in Germany,[50] and doctors in Australia.[51]

Norwegian studies showed statistically significant higher job satisfaction for GPs than for hospital doctors from 2000 to 2006 and in 2008, and no significant differences between GPs and private practice specialist in 2008.[21 22] In our study, JSS decreased significantly for GPs and hospital doctors, but GPs continued with higher scores than their hospital colleagues. GPs and private practice specialists had similar levels of satisfaction in 2010, while the scores were significantly higher for private practice specialist in 2012, 2014 and 2016-17 (Figure 1 with table).

Decline in GP job satisfaction seems to be the rule all over the world. A Danish study showed that the proportion of GPs reporting dissatisfaction with work increased from 6% in 2012 to 22% in 2016. A significant increase in dissatisfaction was found for "working hours", "rate of pay", "freedom to choose methods" and "recognition for good work".[26] The National GP Worklife Survey in the UK documented that satisfaction with "colleagues and fellow workers" improved, while the other nine aspects of job declined from 2010 to 2017. The largest decreases were "working hours", "rate of pay" and "amount of responsibility".[25] The MABEL survey among doctors in Australia also showed a decline from 2013 to 2015 in GP job satisfaction.[27]

According to a recent systematic review on satisfaction of doctors working in hospitals within the European Union based on studies from 2000 to 2017, hospital doctors had a moderate job satisfaction; 4.81 on a scale from 1 to 7.[52] In our sample, hospital doctors reported higher levels of satisfaction: 5.14 in 2010 and 5.00 in 2016-17.

In the Norwegian "Working environment and living conditions survey" from 2010 to 2016, there were no changes in JSS as measured by a five point Likert scale from very dissatisfied to very satisfied. About 90% of the employees reported that they are "quite" or "very satisfied" with their job. In data from 2016, top managers (97%), farmers/fisherman (95%) or physiotherapists (95%) reported a higher level and nurses (89%), policeman (88%) or customer service occupations (82%) a lower level of

satisfaction than the doctors (90%). JSS among employees did not differ between gender and it did increase with age.[53]

Explanation of results

Health care organisations and financial systems are constantly subject to change in most countries. Studies document that changes in the healthcare organisation may influence doctors` work-life and professional satisfaction.[14 54]

As already mentioned, three major health care reforms have been implemented over the last decade in Norway: "The Coordination Reform" in 2012, [32] the "The Free Choice of Hospital Reform" in 2015 [34] and the white paper on "The Future Primary Care – Proximity and Comprehensiveness" in 2015. [35] These reforms are challenging for the doctors, and may explain some of the reduction in satisfaction. Studies showed that high professional autonomy yields better quality of health care and more doctor satisfaction.[18 55] More time spent on direct patient care and less time spent on administrative tasks, and optimal economic conditions in general are also important positive contributors to job satisfaction.[28 56 57] A study based on data from 1994 to 2014 showed that the total weekly working hours remained unchanged for most doctors in Norway, while time spent on direct patient care decreased, particularly for hospital doctors.[42] Another study with data from 2018 documented long working weeks with a wide variety of tasks among GPs.[58] 70% of doctors experienced stress in association with perpetual reorganisations of the national health care system, particularly hospital doctors.[54] A recent survey on hospital doctors' working conditions documented that hospital doctors scored high on items related to engagement at work, assessment of work as meaningful and cooperation with colleagues, but lower on items related to workload and professional autonomy (including openness, participation in decision making, dialogue with the hospital management).[59] In another recent survey on GPs` working conditions,[60] GPs reported that they have a meaningful job with various interesting tasks. However, they also reported considerable growth both in work demand and in the cost of running their own medical office during the last decade. The high work demand was related to increased transfer of tasks that were previously conducted by outpatient clinics or hospitals, for example follow-up care of

pregnant women or patients with chronic diseases like cancer, rheumatic diseases, endocrinological disease, substance abuse or some mental health disorders. In addition, there were increases in consultations, laboratory services for appointment specialists, tasks related to preventive treatment and documentation as well as certification requirements.[60 61]

These findings fit well with our data where several aspects of satisfaction declined significantly. For GPs, the largest decrease was in "amount of responsibility given" followed by "work hours", "recognition for good clinical work", "rate of pay", "overall job satisfaction", and "freedom to choose methods of work". For hospital doctors, the decrease was largest in "freedom to choose methods of work" followed by "rate of pay", "recognition for good clinical work" and "work hours". The high job satisfaction of specialists in private practice probably reflects both professional and time-based autonomy and good economic conditions.

In the longitudinal subsample (the doctors who responded at all four points in time and did not change job position), there were no significant changes neither on the item level nor on estimated JSS from 2010 to 2016-17 (Table 3). A common tendency for GPs, hospital doctors and private practice specialist was a non-significant decrease in job satisfaction from 2014 to 2016-17 (Figure 2). A possible reason for this stability in JSS may be a combination of the adaption of health care regulations over time and the selection of doctors. The most satisfied doctors are more likely to remain in their current job position.

Changes in professional culture may also explain some of the reduced satisfaction. In a study among hospital doctors in Norway, many senior consultants talked about being a doctor as a major part of their identity and lifestyle, while the specialty registrars were more likely to regard their work as a job.[62] In another study, most doctors were satisfied as doctors, but felt it challenging to combine the job with leisure activities and family life. Some senior consultants were of the opinion that specialty registrars were less willing to prioritize professional life and more concerned with their responsibilities outside of work.[63]

The slightly increasing trend in job satisfaction among all Norwegian doctors described from 2000 to 2006[21] did not continue from 2010 to 2016-17. However, the job satisfaction level was still above 5 on a 1 to 7 scale. In surveys from 2018, GPs and hospital doctors described their work as meaningful in spite of considerable work overload.[59 60] This suggests that job satisfaction is also based on internal values. To be in demand and to treat patients were also fundamental elements of doctor satisfaction.[64]

Strengths and limitations

The main strength of this study is that it allows for generalisation to the whole population of doctors in Norway. Similarities in survey methods and repeated measures should also be pointed out. Furthermore, the response rates were fairly good, ranging from 67% and 75%, which are higher than for other surveys of the medical profession, but do not rule out the possibility of non-response bias.[42] However, analyses in Table 2 and 3 show no significant differences in the JSS scores between the longitudinal sample and the unbalanced cohort. The ten item Warr-Cook-Wall scale for job satisfaction was specifically designed for GPs in solo practice in the UK,[6 38] but it has been used extensively to describe total job satisfaction and satisfaction of different level of work in doctor populations both in Norway and elsewhere.[19-22 28-30 40] The validation of this ten item job satisfaction scale in a cohort of Australian medical practitioners provided validity evidence for a single-factor solution and for a use of a composite job satisfaction score. However, it was suggested to include other job-specific items in the scale, especially for doctors having employee status or working in organisational settings.[43]

Conclusion

Job satisfaction for Norwegian doctors remained relatively high, but with a downward trend over the last eight years, where the decrease was statistically significant for GPs and hospital doctors. Private practice specialists were most satisfied, followed by GPs and hospital doctors. The difference between the GPs and the private practice specialists increased over time. While no significant changes were found in the ten JSS items for private practice specialists and doctors in academia, satisfaction with

"working hours", "payment", "recognition for good work" and "freedom to choose methods of work" declined significantly both among GPs and hospital doctors. Several health care reforms and regulations over the last decade and changes in the professional culture may explain some of the reduced satisfaction.

Future research and policy implications

Variations in job satisfaction across job positions call for more separate analyses in the future. The importance of a good professional climate is emphasized in both Norwegian and European working conditions legislature.[65 66] High job satisfaction among doctors is important. It has been found to relate positively to doctors well-being and quality of health care.[9-14] In addition, job satisfaction is an important factor for career decisions like staying in or leaving a current job position.[3 67] Low recruitment to primary care is a concurrent issue in media,[68] health administration[69] and research,[33 70] therefore better job satisfaction is important. This could be achieved through regulation of working hours, improvement of recognition for medical work regarding payment and feedback for good work.

Declarations

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Contributors JR, OGA and MN designed the study. JR undertook the literature review, did the statistical analysis and wrote the first draft. OGA and MN made critical revisions. All authors had full access to all of the data (including statistical reports and tables) and are jointly responsible for the integrity of the data and the accuracy of the data analysis.

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Competing interest None declared.

Ethics approval According to the Regional Committee for Medical Research Ethics, the study based on "Norwegian Physician Survey - A bi-annual prospective questionnaire survey to a representative sample of Norwegian physicians" is exempt from review in Norway, cf. §§ 4 of The Act. The project can be implemented without the approval by the Regional Committee for Medical Research Ethics (IRB 0000 1870). Additionally, approval for data protection of the bi-annual prospective survey among Norwegian doctors was obtained from the Norwegian Social Science Data Service (Reference 19521).

Data sharing statement The authors may be able to provide aggregated data on which the analysis is based, on request. No additional data available.

Patient consent N/A

STROBE Statement: The authors confirm that they have followed the list of the STROBE Statement **(**BMJ 2007;335:806-808).

Transparency declaration: The lead author (Judith Rosta) affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

Figure legends

Figure 1 GLM estimated means of job satisfaction (scored from 1 to 7) controlled for age and gender among doctors in different job positions in 2010, 2012, 2014 and 2016-17

Figure 2 GLM estimated means of job satisfaction (scored from 1 to 7) controlled for age and gender among doctors in different job positions in 2010, 2012, 2014 and 2016-17 with paired t-tests (the longitudinal subsample)

Table 1 **Sample, number of respondents, response rates and the makeup of job categories for respondents where we have data on job satisfaction, gender and age**

	Sample (n)	Respondents[a] (n)	Response rate (%)	Job categories (n / %)							
				All[b]	Doctors in hospital	General practitioners	Specialists in private practice	Doctors in academia	Community medical officers	Doctors in administrative position	Other job categories
2010	1 520	1 014	66.7	948	536 (56.4)	219 (23.1)	57 (6.0)	61 (6.4)	24 (2.5)	19 (2.0)	32 (3.4)
2012	1 792	1 279	71.4	1 164	680 (58.4)	257 (22.1)	60 (5.2)	67 (5.8)	38 (3.3)	30 (2.6)	32 (2.8)
2014	1 545	1 158	75.0	1 057	618 (58.5)	223 (21.1)	60 (5.8)	60 (5.7)	38 (3.6)	28 (2.7)	30 (2.8)
2016-17	2 195	1 604	73.1	1 290	772 (59.8)	263 (20.4)	52 (4.0)	64 (5.0)	55 (4.3)	30 (2.3)	54 (4.2)

(a) Number of respondents with no data on job satisfaction or gender or age or job position were 66 in 2010, 115 in 2012, 101 in 2014 and 146 in 2016-17.

(b) Since interns were only identified in data 2016-17 (n=168), this category is excluded in this paper.

Table 2 **GLM on estimated means, controlled for gender and age, of the 10 job satisfaction scale items (each scored from 1 to 7) among doctors in different type of work in 2010 and 2016-17. Statistically significant differences (95% CI does not overlap) are in bold**

	General practitioners means (95 % CI)		**Doctors in hospital** means (95 % CI)		**Specialists in private practice** means (95 % CI)		**Doctors in academia** means (95 % CI)	
Satisfied with ….	2010 (n=219)	2016-17 (n=263)	2010 (n=536)	2016-17 (n=772)	2010 (n=57)	2016-17 (=52)	2010 (n=61)	2016-17 (n=64)
Amount of responsibility given	**5.36 (5.19-5.53)**	**4.73 (4.57-4.90)**	5.28 (5.17-5.38)	5.19 (5.09-5.29)	5.78 (5.44-6.10)	5.65 (5.28-6.03)	5.81 (5.49-6.12)	5.75 (5.41-6.08)
Variation in work	5.80 (5.65-5.95)	5.60 (5.45-5.75)	5.40 (5.30-5.50)	5.25 (5.16-5.34)	5.30 (5.00-5.60)	5.16 (4.82-5.51)	5.76 (5.48-6.05)	5.50 (5.19-5.80)
Colleagues and fellow workers	5.90 (5.76-6.05)	5.73 (5.58-5.87)	5.56 (5.47-5.65)	5.69 (5.60-5.77)	5.63 (5.34-5.91)	5.46 (5.13-5.79)	5.44 (5.18-5.71)	5.49 (5.19-5.78)
Physical working conditions	5.60 (5.43-5.77)	5.47 (5.31-5.64)	4.81 (4.70-4.92)	4.77 (4.67-4.87)	5.52 (5.18-5.86)	5.32 (4.95-5.69)	4.76 (4.44-5.09)	5.15 (4.82-5.48)
Opportunities to use abilities	5.90 (5.75-6.05)	5.62 (5.47-5.77)	5.46 (5.36-5.56)	5.36 (5.28-5.45)	5.79 (5.50-6.09)	5.74 (5.40-6.08)	6.10 (5.82-6.38)	5.93 (5.62-6.23)
Overall job satisfaction	**5.88 (5.74-6.01)**	**5.49 (5.35-5.63)**	5.51 (5.42-5.60)	5.40 (5.32-5.48)	5.94 (5.66-6.21)	5.86 (5.55-6.17)	5.84 (5.58-6.10)	5.78 (5.50-6.06)
Freedom to choose method of work	**5.66 (5.50-5.82)**	**5.34 (5.18-5.49)**	**4.97 (4.87-5.07)**	**4.67 (4.58-4.76)**	5.90 (5.59-6.22)	5.70 (5.35-6.05)	5.73 (5.43-6.03)	5.67 (5.36-5.99)
Recognition for good work	**5.38 (5.20-5.55)**	**4.83 (4.66-5.01)**	**4.82 (4.71-4.94)**	**4.59 (4.49-4.69)**	5.50 (5.14-5.85)	5.41 (5.01-5.81)	5.26 (4.92-5.59)	5.20 (4.84-5.55)
Rate of pay	**5.40 (5.23-5.57)**	**4.92 (4.75-5.09)**	**4.94 (4.83-5.05)**	**4.68 (4.58-4.77)**	5.66 (5.32-6.00)	5.67 (5.29-6.04)	3.94 (3.62-4.27)	4.51 (4.17-4.85)
Work hours	**4.56 (4.37-4.74)**	**4.00 (3.82-4.18)**	**4.61 (4.49-4.73)**	**4.38 (4.27-4.48)**	5.41 (5.04-5.78)	5.34 (4.93-5.75)	4.86 (4.50-5.21)	5.49 (5.13-5.86)
JSS	**5.54 (5.43-5.65)**	**5.17 (5.07-5.28)**	**5.14 (5.07-5.21)**	**5.00 (4.94-5.06)**	5.64 (5.42-5.86)	5.53 (5.29-5.77)	5.35 (5.14-5.56)	5.45 (5.23-5.66)

Table 3 **GLM on estimated means, controlled for gender and age, of the ten JSS items (each scored from 1 to 7) among doctors in different type of work in the longitudinal sample in 2010 and 2016-17. Statistically significant differences (95% CI do not overlap) are in bold**

	General practitioners means (95 % CI)		Specialists in private practice means (95 % CI)		Doctors in hospital means (95 % CI)	
Satisfied with ….	2010 (n=94)	2016-17 (n=94)	2010 (n=22)	2016-17 (n=22)	2010 (n=233)	2016-17 (n=233)
Amount of responsibility given	5.35 (5.09-5.61)	4.87 (4.57-5.18)	5.35 (5.20-5.50)	5.21 (5.03-5.39)	5.96 (5.55-6.36)	5.82 (5.18-6.46)
Variation in work	5.84 (5.61-6.07)	5.92 (5.73-6.10)	5.41 (5.27-5.55)	5.44 (5.29-5.59)	5.05 (4.91-5.48)	5.27 (4.72-5.83)
Colleagues and fellow workers	5.95 (5.74-6.16)	5.87 (5.67-6.08)	5.63 (5.50-5.77)	5.58 (5.54-5.82)	5.73 (5.32-6.13)	5.68 (4.99-6.37)
Physical working conditions	5.68 (5.46-5.90)	5.70 (5.48-5.93)	4.75 (4.58-4.92)	4.90 (4.73-5.06)	5.86 (5.38-6.35)	5.91 (5.35-6.47)
Opportunities to use abilities	5.87 (5.65-6.10)	6.03 (5.85-6.21)	5.52 (5.38-5.65)	5.56 (5.40-5.71)	5.77 (5.42-6.12)	6.14 (5.53-6.74)
Overall job satisfaction	5.95 (5.77-6.13)	5.70 (5.51-5.90)	6.05 (5.70-6.40)	5.96 (5.35-6.56)	5.54 (5.42-5.66)	5.44 (5.30-5.58)
Freedom to choose method of work	5.75 (5.55-5.95)	5.48 (5.27-5.69)	6.05 (5.63-6.46)	5.91 (5.30-6.52)	4.98 (4.82-5.14)	4.96 (4.80-5.13)
Recognition for good work	5.40 (5.16-5.65)	5.15 (4.89-5.41)	5.50 (5.09-5.92)	5.77 (5.20-6.34)	4.91 (4.74-5.09)	4.79 (4.61-4.98)
Rate of pay	5.47 (5.24-5.70)	5.16 (4.90-5.42)	5.91 (5.52-6.30)	6.00 (5.44-6.56)	4.97 (4.79-5.14)	4.90 (4.74-5.06)
Work hours	4.49 (4.19-4.79)	3.92 (3.59-4.24)	5.46 (4.89-6.02)	5.63 (5.04-6.24)	4.52 (4.34-4.70)	4.48 (4.30-4.76)
JSS	5.58 (5.42-5.73)	5.38 (5.23-5.53)	5.73 (5.52-5.95)	5.81 (5.32-6.30)	5.16 (5.06-5.26)	5.14 (5.03-5.25)

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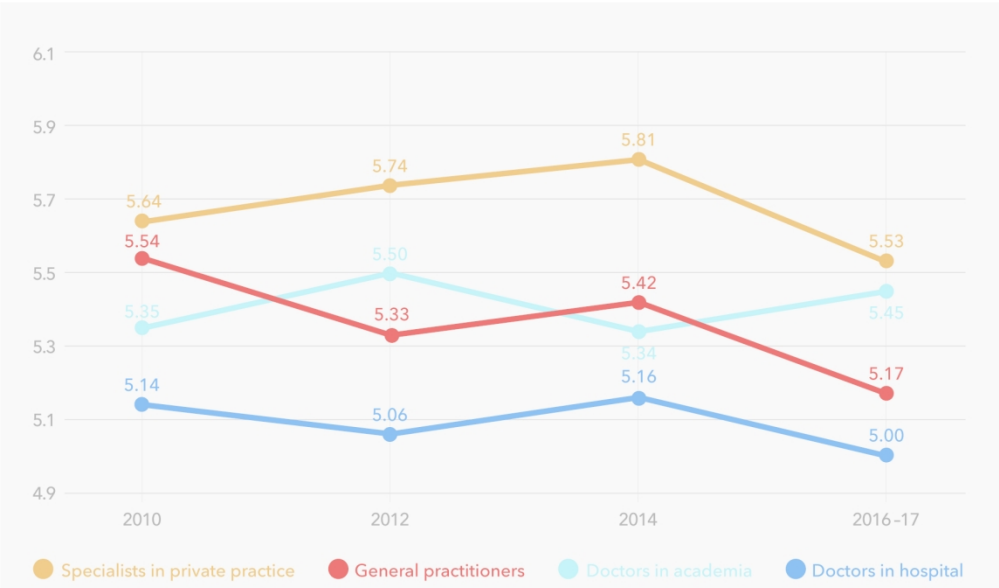
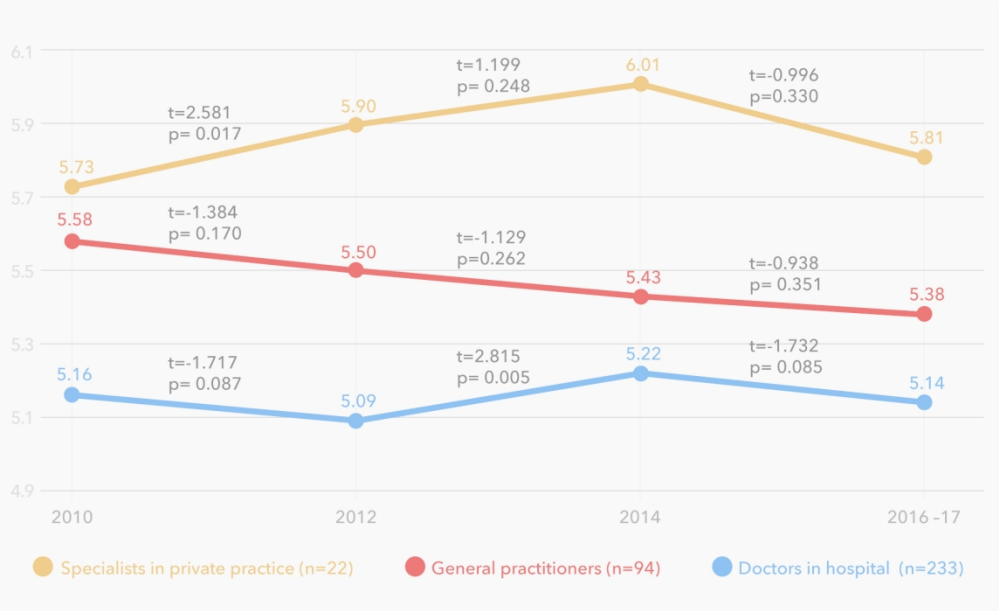


	2010 mean (95 % CI)	2012 mean (95 % CI)	2014 mean (95 % CI)	2016-17 mean (95 % CI)
General practitioners	5.54 (5.43-5.65)	5.33 (5.23-5.44)	5.42 (5.31-5.54)	5.17 (5.07-5.28)
Doctors in hospital	5.14 (5.07-5.21)	5.06 (5.00-5.12)	5.16 (5.09-5.23)	5.00 (4.94-5.06)
Specialists in private practice	5.64 (5.42-5.86)	5.74 (5.52-5.95)	5.81 (5.59-6.03)	5.53 (5.29-5.77)
Doctors in academia	5.35 (5.14-5.56)	5.50 (5.30-5.70)	5.34 (5.12-5.55)	5.45 (5.23-5.66)

GLM estimated means of job satisfaction (scored from 1 to 7) controlled for age and gender among doctors in different job positions in 2010, 2012, 2014 and 2016-17



GLM estimated means of job satisfaction (scored from 1 to 7) controlled for age and gender among doctors in different job positions in 2010, 2012, 2014 and 2016-17 with paired t-tests (the longitudinal subsample)

STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*
Checklist for cohort, case-control, and cross-sectional studies (combined)

Manuscript ID bmjopen-2018-027891: Changes in job satisfaction among doctors in Norway from 2010 to 2017.A study based on repeated surveys
Judith ROSTA, Olaf G. AASLAND, Magne NYLENNA

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any pre-specified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	6
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7-9
Bias	9	Describe any efforts to address potential sources of bias	17
Study size	10	Explain how the study size was arrived at	6 and Table 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	9
		(*c*) Explain how missing data were addressed	9

		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10 and Table 1
		(b) Give reasons for non-participation at each stage	10 and Table 1
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10
		(b) Indicate number of participants with missing data for each variable of interest	10 and Table 1
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	N/A
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	N/A
		Cross-sectional study—Report numbers of outcome events or summary measures	11
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11-12 and Figure 1, 2 and Table 2, 3
		(*b*) Report category boundaries when continuous variables were categorized	N/A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	11-12 and Table 2, 3
Discussion			
Key results	18	Summarise key results with reference to study objectives	13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	13-15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	N/A

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Changes in job satisfaction among doctors in Norway from 2010 to 2017.A study based on repeated surveys

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Changes in job satisfaction among doctors in Norway from 2010 to 2017. A study based on repeated surveys

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ABSTRACT

OBJECTIVE

To assess job satisfaction for different categories of Norwegian doctors from 2010 to 2016-17.

DESIGN

Cross sectional surveys in 2010, 2012, 2014 and 2016-17 of partly overlapping samples.

SETTING

Norway from 2010 to 2016-17.

PARTICIPANTS

Doctors working in different job positions (hospital doctors, GPs, private practice specialists, doctors in academia). Response rates were 67% (1014/1520) in 2010, 71% (1279/1792) in 2012, 75% (1158/1545) in 2014 and 73% (1604/2195) in 2016-17. The same 548 doctors responded at all four points in time.

MAIN OUTCOME MEASURE

Job Satisfaction Scale (JSS), a 10-item widely used instrument, with scores ranging from 1 (low satisfaction) to 7 (high satisfaction) for each item, and an unweighted mean total sum score.

ANALYSIS

GLM, controlling for gender and age, and paired t-tests.

RESULTS

For all doctors, the mean scores of JSS decreased significantly from 5.52 (95% confidence interval 5.42 to 5.61) in 2010 to 5.30 (5.22 to 5.38) in 2016-17. The decrease was significant for GPs (5.54, 5.43 to 5.65 vs. 5.17, 5.07 to 5.28) and hospital doctors (5.14, 5.07 to 5.21 vs. 5.00, 4.94 to 5.06). Private practice specialists were most satisfied, followed by GPs and hospital doctors. The difference between the GPs and the private practice specialists increased over time.

CONCLUSIONS

From 2010 to 2016-17 job satisfaction for Norwegian doctors decreased, but it was still at a relatively high level. Several health care reforms and regulations over the last decade and changes in the professional culture may explain some of the reduced satisfaction.

KEYWORDS: Job satisfaction, doctors, Norway, repeated surveys

Strengths and limitations of the study

The surveys had high response rates.

The data allowed for generalisation to the whole doctor workforce in Norway.

There were similarities in survey methods and measurements at all four points in time.

The ten item version of the Warr-Cook-Wall scale for job satisfaction was specifically modified for GPs in the UK, but it has been used extensively in doctor populations both in Norway and elsewhere.

Analyses were based on self-reported questionnaire data with the possibility of both over- and underestimation.

INTRODUCTION

Job satisfaction is important both for individual employees and organisations. It is linked to employees` productivity,[1] absenteeism,[2] turnover,[3] physical and mental health and well-being.[3-6]

For doctors, wellness is crucial to the delivery of good health care and has been identified as a missing quality indicator.[7] Satisfaction is a substantial element of professional wellness and has as such become a key performance indicator in quality systems.[8] While a high level of job satisfaction is associated with positive outcomes, doctors' job discontent may become a threat to the quality of patient care and safety, on an individual as well as on a system level.[9-14]

Doctors' job satisfaction is related to work load, healthcare organization and management, professional autonomy, the ability to provide high quality health care, and financial systems including personal income.[14-19]

Two important reforms were introduced in Norway at the beginning of the 21 century: "The Regular General Practitioners Scheme" in 2001 and "The Hospital Reform" in 2002. The Regular General Practitioners Scheme introduced a list-patient system whereby all inhabitants in Norway have their assigned general practitioner. This reform aimed at enhancing access to general practitioners and continuity in the patient-doctor relationship. The implementation of the list-patient system has modified the structure of GPs` remuneration into a combination of three sources: capitation based payment from the local government, fee-for-service payment from NAV (the National Insurance System) and out-of-pocket payments from patients. The Hospital Reform transferred the ownership of hospitals and specialist health services from the county to the state level, organised through central and local health enterprises.

Previous studies showed that the satisfaction level among doctors in Norway was stable and high from 1994 to 2002[20] and even increased from 2000 to 2006.[21] General practitioners and private practice

specialists were generally more satisfied than hospital doctors.[21 22] The above mentioned comprehensive reforms did not have any detectable positive or negative impact on the job satisfaction of neither hospital doctors nor GPs,[21] as opposed to an international negative trend.[23-27] The satisfaction level of doctors in Norway was higher than in comparable countries like Germany,[28 29] Iceland[30] and the US.[19]

Three new organizational reforms have also been introduced in Norwegian health care over the last decade. "The Coordination Reform" from 2012 intended to improve the collaboration between specialist (secondary) and municipal (primary) health care levels by placing more responsibility for individual patients on the local community. This has resulted in an increased workload on the general practitioners,[31 32] which so far has not been compensated by a corresponding strengthening in resources and staffing.[33] "The Free Choice of Hospital Reform" in 2015 gave the users a free choice of hospital,[34] and the white paper on "The Future Primary Care – Proximity and Comprehensiveness" in 2015 was implemented to improve user involvement, availability, prevention, proactivity and collaboration between multidisciplinary teams.[35] Recent surveys on hospital doctors` and GP` working conditions documented high workload and considerable growth in work demand.[36 37] The impact of the latest reforms on doctors' job satisfaction has so far been insufficiently explored.

There are several instruments to measure job satisfaction, including single items and multi-item scales.[6 38 39] A widely used instrument in health care settings is the ten item version[40] of the Warr-Cook-Wall job satisfaction scale (JSS),[6] assessing both total job satisfaction and satisfaction with different aspects of the job.[19-21 26 28-30 40-42] It also allows for good national and international comparisons.

This paper reports the development of job satisfaction among Norwegian doctors from 2010 to 2016-17 with special emphasis on general practitioners and a possible effect of the latest reforms.

MATERIALS AND METHODS

Design and participants

Since 1994 the Institute for Studies of the Medical Profession (LEFO, www.legeforsk.org) has regularly surveyed a representative panel of active Norwegian doctors biannually with postal questionnaires. The original panel was based on an invitation to 2,000 randomly selected active Norwegian doctors in 1993. The 1,272 doctors who agreed to participate were representative of the total doctor work force in terms of age, sex, specialty and place of work. Since then approximately 540 doctors have left the panel due to retirement, death, or voluntary withdrawal. Therefore, the panel was supplemented with approximately 400 young doctors in 2000, 250 young doctors in 2008, 300 in 2012 and 650 doctors in 2016-17, maintaining the representativity.[43 44] With this in and out pattern our cohort constitutes what may be called an unbalanced cohort.

This article is based on data from 2010, 2012, 2014 (partly in 2015) and 2016 (partly in 2017).

Inclusion and exclusion criteria

Since interns were only identified in data from 2016-17, this category is excluded in this paper.

Ethical approval

According to the Regional Committee for Medical Research Ethics, the study based on “Norwegian Physician Survey - A bi-annual prospective questionnaire survey to a representative sample of Norwegian physicians” is exempt from review in Norway, cf. §§ 4 of The Act. The project can be implemented without the approval by the Regional Committee for Medical Research Ethics (IRB 0000 1870). All invitees received a letter with a description of the "Norwegian Physician Survey" aim. It was also explained that the participation is voluntary and the data would be handled confidentially. All participants signed informed written consent before the start of the survey.

Dependent variables

Total job satisfaction and *satisfaction with different aspects of the job* were measured with the ten item version[40] of the "Job Satisfaction Scale" by Warr, Cook and Wall.[6]

The original scale included one item assessing the overall satisfaction and fifteen items assessing two factors related to job satisfaction, the intrinsic factor (seven items on attitudes towards personal achievement and task success: freedom to choose your own method of working, recognition you get for good work, the amount of responsibility you are given, your opportunity to use your abilities, your chance of promotion, the attention payed to suggestions you make, the amount of variety in your job) and extrinsic factor (eight items on attitudes on working conditions: physical working conditions, your fellow workers, your immediate boss, your rate of pay, industrial relations between management and workers in your firm, the way your firm is managed, your hours of work, your job security). The total job satisfaction was calculated as the sum of all separate items. The scale was tested for validity and reliability in blue-collar male workers employed full-time in a manufactural industry in the United Kingdom.[6]

The ten item form of the original scale was devised by Cooper-Rout-Faragher in 1989 to study job satisfaction, mental health and stress among general practitioners in England. Five items were removed from the original scale that were not relevant for the general practitioners population: "your immediate boss", "industrial relations between management and workers in your firm", "your chance of promotion", "the way your firm is managed" and "your job security". The scale was not tested for validity and reliability by Cooper, Rout and Faragher.[40] A validation study of this scale was done in a cohort of Australian clinical medical workforce by Hills, Joyce and Humphries in 2012, where the original seven point Likert scale was reduced to five point Likert scale from 0 (very dissatisfied) to 4 (very satisfied). Factor analytic and internal reliability tests did not support differentiating intrinsic and extrinsic factors. They supported the use of the ten item instrument as a single-factor scale and the use of a composite job satisfaction score.[45]

The ten item version[40] of the original Warr-Cook-Wall questionnaire with seven point Likert scale[6] was used extensively in doctors population in Norway and elsewhere.[19-22 26 28-30 41 42] We applied this instrument in our study to allow comparisons across countries and over time. The ten items were:

How satisfied are you with:

(1) The amount of responsibility you are given

(2) Variation of work

(3) Your colleagues and fellow workers

(4) Your physical work conditions

(5) Your opportunities to use your skills

(6) Your overall job situation

(7) The freedom to choose your own methods of working

(8) The recognition you get for good achievements

(9) Your rate of pay

(10) Your work hours

We asked the doctors to score each of the ten items on a seven point Likert scale from 1 (very dissatisfied) to 7 (very satisfied). An unweighted mean sum score was calculated, as well as analyses of single items.

Independent variables

There are several possible job positions for doctors in Norway. For the purpose of this study, they are collapsed into the following seven categories:

(a) Doctors in hospital: doctors in management positions (medical superintendent, head of department, chief senior consultant, head of unit, senior consultant, head of section), senior hospital consultants and specialty registrars

(b) General practitioners

(c) Specialists working in private practice

(d) Doctors in academia: professor, associate professor, research fellow, and researcher

(e) Community medical officers: district medical officer, senior district medical officer, nursing home medical officer, visiting medical officer, doctor at infant welfare clinic, community general practitioner

(f) Doctors in administrative positions: county medical officer, medical advisor, chief medical officer

(g) Other job categories

Other independent variables were *gender* and *age.*

Analyses

The distribution of JSS was close to normal (Kolmogorov-Smirnov test 0.56, $p < 0.001$) with a slightly negative skewness (-0.62). Thus the use of parametric tests was unproblematic. General Linear modelling (GLM) controlled for gender and age was used to estimate the means of job satisfaction at the four points in time: 2010, 2012, 2014, and 2016-17. Statistically significant differences were assumed when the 95% confidence intervals were not overlapping.

Paired t-tests were used to show individual differences between two points in time.

Three different samples were analysed. The first consisted of all respondents at all times, the *unbalanced cohort*. Here respondents with missing data on gender or age or all JSS items were excluded. The second sample comprised doctors with defined job positions in one of four categories: GPs, specialists in private practice, hospital doctors, and doctors in academia in minimum one survey. The third, *longitudinal* sample were the doctors who responded at all four points in time. A subsample here were the doctors who did not change job position during the observational period.

Predictive Analytics Software Statistics 25 was used for the analyses.

Patient and public involvement

No patients were involved in setting the research questions or the outcome measures, nor were they involved in the design and implementation of the study. There are no plans to involve patients in dissemination.

RESULTS

Respondents

Table 1 shows the sample, number of respondents, response rates and the makeup of job positions for which we have data on JSS, gender and age: 948 in 2010, 1164 in 2012, 1057 in 2014 and 1290 in 2016-17. The majority of respondents worked in hospitals.

Table 1

The proportion of females increased from 37.4% (95 % CI 34.3 to 40.5) in 2010, to 43.4% (40.6 to 46.3) in 2012, was 42.5% (39.5 to 45.5) in 2014 and increased further to 52.9% (50.3 to 55.5) in 2016-17. The mean age was 50.7 (95% CI 49.9 to 51.6) years in 2010, 49.7 (48.9 to 50.4) years in 2012, 50.5 (49.7 to 51.3) years in 2014 and 47.7 (46.9 to 48.4) years in 2016-17.

The representativity of the data for 2010, 2012 and 2014 is described elsewhere.[44] Data for 2016-17 are comparable with the Norwegian doctor workforce in 2016-17 regarding age, but with a slightly higher percentage of females, and doctors in academia (data not shown). The distribution of doctors in different job positions are comparable over the study period (Table 1).

548 doctors responded at all four time points, 202 (37%) females. Mean age in 2010 was 48.1 years. 64.8% (355/548) were stable in their jobs over the period: 233 hospital doctors, 94 GPs, 22 private practice specialists and 6 doctors in academia. Due to the low number of doctors in academia, this group is excluded in some of the analyses.

Changes in job satisfaction

All doctors

The estimated mean of job satisfaction, controlled for gender, age and job position for all respondents in 2016-17, was 5.30, (95% CI 5.22 to 5.38), which is significantly lower than in 2010 (5.52, 5.42 to 5.61), and non-significantly different from 2012 (5.45, 5.37 to 5.54) and 2014 (5.44, 5.35 to 5.53).

Doctors in different job positions

Over the whole period, the mean score of job satisfaction decreased for GPs and for hospital doctors. Private practice specialists were the most satisfied, while hospital doctors were least satisfied. No differences were found between GPs and doctors in academia. Job satisfaction generally increased from 2012 to 2014 and decreased from 2014 to 2016-17 for GPs, private practice specialists and hospital doctors. In 2016-17, GPs reported significantly higher satisfaction than hospital doctors, and significantly lower satisfaction than private practice specialists.

Figure 1 with table

From 2010 to 2016-17 there was a non-significant change in JSS for other job positions such as community medical officers (5.59, 95% CI 5.26 to 5.91 vs. 5.33, 5.10 to 5.56), doctors in administration (5.75, 5.38 to 6.12 vs. 5.39, 5.08 to 5.71) and doctors in other positions (5.61, 5.32 to 5.89 vs. 5.23, 4.99 to 5.46).

Effect of age, gender and specialty on estimated means of JSS

There were no gender differences. JSS increased with increasing age. Among hospital doctors, JSS did not vary significantly over time across medical specialties (data not shown).

Changes in JSS in the longitudinal sample

All doctors

Using paired sample t-tests, JSS scores were found to change non-significantly from 2010 to 2012 (5.30 vs. 5.34; t=1.43; p=0.152), to increase significantly from 2012 to 2014 (5.34 vs. 5.41; t=2.19; p=0.029) and then to decrease significantly from 2014 to 2016-17 (5.41 vs. 5.34; t=-2.03; p=0.043).

Hospital doctors, GPs and private practice specialists

From 2010 to 2016-17 in the longitudinal subsample, the JSS scores for GPs decreased steadily. A significant increase in JSS scores was found for specialists in private practice from 2010 to 2012, and for hospital doctors from 2012 to 2014. For all three job positions, there was a non-significant decline in JSS from 2014 to 2016-17. At any point in time, private practice specialists were the most satisfied. GPs were more satisfied than hospital doctors, but the difference between these groups decreased.

Figure 2

Changes on the item level

For GPs and doctors in hospital, the item scores on "freedom to choose methods", "recognition for good work", "rate of pay" and "work hours" decreased significantly from 2010 to 2016-17. Also, GPs reported significantly lower scores for "amount of responsibility" and "overall job satisfaction ". No significant changes on the item level were found for private practice specialists and for doctors in academia.

Table 2

The same pattern was found in the longitudinal subsample for GPs and hospital doctors, although not statistically significant.

Table 3

DISCUSSION

Main findings

From 2010 to 2016-17, job satisfaction for all doctors decreased significantly. The decrease was statistically significant for GPs and for hospital doctors. Private practice specialists were most satisfied, followed by GPs and hospital doctors. The difference between the GPs and the private practice specialist increased over time. Of the ten JSS items, scores on "working hours", "payment", "recognition for good work" and "freedom to choose methods of work" declined significantly, both among GPs and hospital doctors, while no significant changes were found for specialists in private practice and doctors in academia (Table 2, Figure 1). In the longitudinal subsample, there was a non-significant decline in JSS for GPs, hospital doctors and private practice specialists from 2014 to 2016-17 (Figure 2).

Comparison with other studies

Differences in methodology limit direct comparisons with other studies. However, it is possible to point out some international trends in job satisfaction; older doctors report higher job satisfaction, and there are no gender differences.[20 22 29 41] Age changes in satisfaction are related to the lowered expectations over time, higher remuneration, higher perceived autonomy and more experience.[21 46 47]

In Norway, job satisfaction was stable and high from 1994 to 2002,[20] increased from 2000 to 2006,[21] and decreased from 2010 to 2016-17. However, it was still at a relatively high level in 2016-17, higher than in 2000, 2002, 2004 and lower than in 2006.[20] Longitudinal studies on doctors' job satisfaction are few and show a mixed pattern. A study on doctors` intention to work in the UK suggested a decrease in their satisfaction. The fraction of UK-trained doctors who would "probably not" or "definitely not" practice medicine in the UK increased from 8% in 1996-2011 to 15% in 2015.[23] Decreasing professional satisfaction was also described among doctors in the US.[24] On the other hand, increased satisfaction with work has been reported from doctors in the Netherlands from 2000 to 2009[48] and from six graduation cohorts from 1996 to 2012 in the UK.[49] High levels of job satisfaction

were documented from emergency medicine residents in the US,[50] family physicians in Canada,[51] primary care physicians in Germany,[52] and doctors in Australia.[53]

Norwegian studies showed statistically significant higher job satisfaction for GPs than for hospital doctors from 2000 to 2006 and in 2008, and no significant differences between GPs and private practice specialist in 2008.[21 22] In our study, job satisfaction decreased significantly for GPs and hospital doctors, but GPs continued with higher scores than their hospital colleagues. GPs and private practice specialists had similar levels of satisfaction in 2010, while the scores were significantly higher for private practice specialist in 2012, 2014 and 2016-17 (Figure 1 with table).

Decline in GP job satisfaction seems to be the rule all over the world. A Danish study showed that the proportion of GPs reporting dissatisfaction with work increased from 6% in 2012 to 22% in 2016. A significant increase in dissatisfaction was found for "working hours", "rate of pay", "freedom to choose methods" and "recognition for good work".[26] The National GP Worklife Survey in the UK documented that satisfaction with "colleagues and fellow workers" improved, while the other nine aspects of job declined from 2010 to 2017. The largest decreases were "working hours", "rate of pay" and "amount of responsibility".[25] The MABEL survey among doctors in Australia also showed a decline from 2013 to 2015 in GP job satisfaction.[27]

According to a recent systematic review on satisfaction of doctors working in hospitals within the European Union based on studies from 2000 to 2017, hospital doctors had a moderate job satisfaction; 4.81 on a scale from 1 to 7.[54] In our sample, hospital doctors reported higher levels of satisfaction: 5.14 in 2010 and 5.00 in 2016-17.

In the Norwegian "Working environment and living conditions survey" from 2010 to 2016, there were no changes in JSS as measured by a five point Likert scale from very dissatisfied to very satisfied. About 90% of the employees reported that they are "quite" or "very satisfied" with their job. In data from 2016, top managers (97%), farmers/fisherman (95%) or physiotherapists (95%) reported a higher

level and nurses (89%), policemen (88%) or customer service occupations (82%) a lower level of satisfaction than the doctors (90%). JSS among employees did not differ between gender and it did increase with age.[55]

Explanation of results

Health care organisations and financial systems are constantly subject to change in most countries. Studies document that changes in the healthcare organisation may influence doctors` work-life and professional satisfaction.[14 56]

As already mentioned, three major health care reforms have been implemented over the last decade in Norway: "The Coordination Reform" in 2012, [32] the "The Free Choice of Hospital Reform" in 2015 [34] and the white paper on "The Future Primary Care – Proximity and Comprehensiveness" in 2015. [35] These reforms are challenging for the doctors, and may explain some of the reduction in satisfaction. Studies showed that high professional autonomy yields better quality of health care and more doctor satisfaction.[18 57] More time spent on direct patient care and less time spent on administrative tasks, and optimal economic conditions in general are also important positive contributors to job satisfaction.[28 58 59] A study based on data from 1994 to 2014 showed that the total weekly working hours remained unchanged for most doctors in Norway, while time spent on direct patient care decreased, particularly for hospital doctors.[44] Another study with data from 2018 documented long working weeks with a wide variety of tasks among GPs.[60] 70% of doctors experienced stress in association with perpetual reorganisations of the national health care system, particularly hospital doctors.[56] A recent survey on hospital doctors' working conditions documented that hospital doctors scored high on items related to engagement at work, assessment of work as meaningful and cooperation with colleagues, but lower on items related to workload and professional autonomy (including openness, participation in decision making, dialogue with the hospital management).[36] In another recent survey on GPs` working conditions,[37] GPs reported that they have a meaningful job with various interesting tasks. However, they also reported considerable growth both in work demand and in the cost of running their own medical office during the last decade. The high work demand was related to increased transfer of tasks

that were previously conducted by outpatient clinics or hospitals, for example follow-up care of pregnant women or patients with chronic diseases like cancer, rheumatic diseases, endocrinological disease, substance abuse or some mental health disorders. In addition, there were increases in consultations, laboratory services for appointment specialists, tasks related to preventive treatment and documentation as well as certification requirements.[37 61]

These findings fit well with our data where several aspects of satisfaction declined significantly. For GPs, the largest decrease was in "amount of responsibility given" followed by "work hours", "recognition for good clinical work", "rate of pay", "overall job satisfaction", and "freedom to choose methods of work". For hospital doctors, the decrease was largest in "freedom to choose methods of work" followed by "rate of pay", "recognition for good clinical work" and "work hours". The high job satisfaction of specialists in private practice probably reflects both professional and time-based autonomy and good economic conditions.

In the longitudinal subsample (the doctors who responded at all four points in time and did not change job position), there were no significant changes neither on the item level nor on estimated job satisfaction from 2010 to 2016-17 (Table 3). A common tendency for GPs, hospital doctors and private practice specialist was a non-significant decrease in job satisfaction from 2014 to 2016-17 (Figure 2). A possible reason for this stability in job satisfaction may be a combination of the adaption of health care regulations over time and the selection of doctors. The most satisfied doctors are more likely to remain in their current job position.

Changes in professional culture may also explain some of the reduced satisfaction. In a study among hospital doctors in Norway, many senior consultants talked about being a doctor as a major part of their identity and lifestyle, while the specialty registrars were more likely to regard their work as a job.[62] In another study, most doctors were satisfied as doctors, but felt it challenging to combine the job with leisure activities and family life. Some senior consultants were of the opinion that specialty

registrars were less willing to prioritize professional life and more concerned with their responsibilities outside of work.[63]

The slightly increasing trend in job satisfaction among all Norwegian doctors described from 2000 to 2006[21] did not continue from 2010 to 2016-17. However, the job satisfaction level was still above 5 on a 1 to 7 scale. In surveys from 2018, GPs and hospital doctors described their work as meaningful in spite of considerable work overload.[36 37] This suggests that job satisfaction is also based on internal values. To be in demand and to treat patients were also fundamental elements of doctor satisfaction.[64]

Strengths and limitations

The main strength of this study is that it allows for generalisation to the whole population of doctors in Norway. Similarities in survey methods and repeated measures over time is another advantage. Furthermore, the response rates were fairly good, ranging from 67% and 75%, which are higher than for other surveys of the medical profession, but do not rule out the possibility of non-response bias.[44] It is possible that the doctors with a particularly heavy work burden and therefore a probable lower job satisfaction to a lesser degree than others responded to the questionnaire, leading to an overestimation of satisfaction level. On the other hand, doctors who are dissatisfied with their working conditions might to a larger degree want to express their opinion, which could lead to lower satisfaction scores. A study based on two cross-sectional surveys among English GPs from 2004 and 2005 supported an association between response and satisfaction, respectively less satisfied GPs were more likely to response.[65] However, our follow-up of the unbalanced cohort showed changes in the partly overlapping samples of doctors over time, which give us valid data of changes in satisfaction. When it comes to measuring subjective satisfaction, there is in general no alternative to survey individuals in a random sample.[66] We do not know whether there is a tendency in our sample towards over- or underestimation of the satisfaction levels with various components of working conditions, or whether there are job-category or medical-discipline-specific differences in the self-reporting. Again, an unbalanced cohort design with follow-up of the partly overlapping sample of doctors, gives us robust data of changes in satisfaction. Another concern is that there is no gold standard of measuring doctors`

job satisfaction with a global, check-list based measure.[39] The ten item Warr-Cook-Wall scale for job satisfaction was specifically designed for GPs in solo practice in the UK,[6 40] but it has been used extensively to describe total job satisfaction and satisfaction of different level of work in doctor populations both in Norway and elsewhere.[19-22 28-30 42] The validation of this ten item job satisfaction scale in a cohort of Australian medical practitioners provided validity evidence for a single-factor solution and for a use of a composite job satisfaction score. However, it was suggested to include other job-specific items in the scale, especially for doctors having employee status or working in organisational settings.[45] Because job satisfaction varies with personality,[6 7] well-being,[7 8] mental and physical health status,[3-5 40] it is also important to include these co-variates in future analyses.

Conclusion

Job satisfaction for Norwegian doctors remained relatively high, but with a downward trend over the last eight years, where the decrease was statistically significant for GPs and hospital doctors. Private practice specialists were most satisfied, followed by GPs and hospital doctors. The difference between the GPs and the private practice specialists increased over time. While no significant changes were found in the ten job satisfaction scale items for private practice specialists and doctors in academia, satisfaction with "working hours", "payment", "recognition for good work" and "freedom to choose methods of work" declined significantly both among GPs and hospital doctors. Several health care reforms and regulations over the last decade and changes in the professional culture may explain some of the reduced satisfaction.

Future research and policy implications

Variations in job satisfaction across job positions call for more separate analyses in the future. The importance of a good professional climate is emphasized in both Norwegian and European working conditions legislature.[68 69] High job satisfaction among doctors is important. It has been found to relate positively to doctors well-being and quality of health care.[9-14] In addition, job satisfaction is an important factor for career decisions like staying in or leaving a current job position.[3 70] Low recruitment to primary care is a concurrent issue in media,[71] health administration[72] and research,[33 73]

therefore better job satisfaction is important. This could be achieved through regulation of working hours, improvement of recognition for medical work regarding payment and feedback for good work.

Declarations

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Contributors JR, OGA and MN designed the study. JR undertook the literature review, did the statistical analysis and wrote the first draft. OGA and MN made critical revisions. All authors had full access to all of the data (including statistical reports and tables) and are jointly responsible for the integrity of the data and the accuracy of the data analysis.

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Competing interest None declared.

Ethics approval According to the Regional Committee for Medical Research Ethics, the study based on "Norwegian Physician Survey - A bi-annual prospective questionnaire survey to a representative sample of Norwegian physicians" is exempt from review in Norway, cf. §§ 4 of The Act. The project can be implemented without the approval by the Regional Committee for Medical Research Ethics (IRB 0000 1870). Additionally, approval for data protection of the bi-annual prospective survey among Norwegian doctors was obtained from the Norwegian Social Science Data Service (Reference 19521).

Data sharing statement The authors may be able to provide aggregated data on which the analysis is based, on request. No additional data available.

Patient consent N/A

STROBE Statement: The authors confirm that they have followed the list of the STROBE Statement **(**BMJ 2007;335:806-808).

Transparency declaration: The lead author (Judith Rosta) affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

Figure legends

Figure 1 GLM estimated means of job satisfaction (scored from 1 to 7) controlled for age and gender among doctors in different job positions in 2010, 2012, 2014 and 2016-17 (the unbalanced cohort)

Figure 2 GLM estimated means of job satisfaction (scored from 1 to 7) controlled for age and gender among doctors in different job positions in 2010, 2012, 2014 and 2016-17 with paired t-tests (the longitudinal subsample)

Table 1 Sample, number of respondents, response rates and the makeup of job categories for respondents where we have data on job satisfaction, gender and age

	Sample (n)	Respondents[a] (n)	Response rate (%)	Job categories (n / %)							
				All[b]	Doctors in hospital	General practitioners	Specialists in private practice	Doctors in academia	Community medical officers	Doctors in administrative position	Other job categories
2010	1 520	1 014	66.7	948	536 (56.4)	219 (23.1)	57 (6.0)	61 (6.4)	24 (2.5)	19 (2.0)	32 (3.4)
2012	1 792	1 279	71.4	1 164	680 (58.4)	257 (22.1)	60 (5.2)	67 (5.8)	38 (3.3)	30 (2.6)	32 (2.8)
2014	1 545	1 158	75.0	1 057	618 (58.5)	223 (21.1)	60 (5.8)	60 (5.7)	38 (3.6)	28 (2.7)	30 (2.8)
2016-17	2 195	1 604	73.1	1 290	772 (59.8)	263 (20.4)	52 (4.0)	64 (5.0)	55 (4.3)	30 (2.3)	54 (4.2)

(a) Number of respondents with no data on job satisfaction or gender or age or job position were 66 in 2010, 115 in 2012, 101 in 2014 and 146 in 2016-17.

(b) Since interns were only identified in data 2016-17 (n=168), this category is excluded in this paper.

Table 2 **GLM on estimated means, controlled for gender and age, of the 10 job satisfaction scale items (each scored from 1 to 7) among doctors in different type of work in 2010 and 2016-17. Statistically significant differences (95% CI does not overlap) are in bold**

	General practitioners means (95 % CI)		**Doctors in hospital** means (95 % CI)		**Specialists in private practice** means (95 % CI)		**Doctors in academia** means (95 % CI)	
Satisfied with ….	2010 (n=219)	2016-17 (n=263)	2010 (n=536)	2016-17 (n=772)	2010 (n=57)	2016-17 (=52)	2010 (n=61)	2016-17 (n=64)
Amount of responsibility given	**5.36 (5.19-5.53)**	**4.73 (4.57-4.90)**	5.28 (5.17-5.38)	5.19 (5.09-5.29)	5.78 (5.44-6.10)	5.65 (5.28-6.03)	5.81 (5.49-6.12)	5.75 (5.41-6.08)
Variation in work	5.80 (5.65-5.95)	5.60 (5.45-5.75)	5.40 (5.30-5.50)	5.25 (5.16-5.34)	5.30 (5.00-5.60)	5.16 (4.82-5.51)	5.76 (5.48-6.05)	5.50 (5.19-5.80)
Colleagues and fellow workers	5.90 (5.76-6.05)	5.73 (5.58-5.87)	5.56 (5.47-5.65)	5.69 (5.60-5.77)	5.63 (5.34-5.91)	5.46 (5.13-5.79)	5.44 (5.18-5.71)	5.49 (5.19-5.78)
Physical working conditions	5.60 (5.43-5.77)	5.47 (5.31-5.64)	4.81 (4.70-4.92)	4.77 (4.67-4.87)	5.52 (5.18-5.86)	5.32 (4.95-5.69)	4.76 (4.44-5.09)	5.15 (4.82-5.48)
Opportunities to use abilities	5.90 (5.75-6.05)	5.62 (5.47-5.77)	5.46 (5.36-5.56)	5.36 (5.28-5.45)	5.79 (5.50-6.09)	5.74 (5.40-6.08)	6.10 (5.82-6.38)	5.93 (5.62-6.23)
Overall job satisfaction	**5.88 (5.74-6.01)**	**5.49 (5.35-5.63)**	5.51 (5.42-5.60)	5.40 (5.32-5.48)	5.94 (5.66-6.21)	5.86 (5.55-6.17)	5.84 (5.58-6.10)	5.78 (5.50-6.06)
Freedom to choose method of work	**5.66 (5.50-5.82)**	**5.34 (5.18-5.49)**	**4.97 (4.87-5.07)**	**4.67 (4.58-4.76)**	5.90 (5.59-6.22)	5.70 (5.35-6.05)	5.73 (5.43-6.03)	5.67 (5.36-5.99)
Recognition for good work	**5.38 (5.20-5.55)**	**4.83 (4.66-5.01)**	**4.82 (4.71-4.94)**	**4.59 (4.49-4.69)**	5.50 (5.14-5.85)	5.41 (5.01-5.81)	5.26 (4.92-5.59)	5.20 (4.84-5.55)
Rate of pay	**5.40 (5.23-5.57)**	**4.92 (4.75-5.09)**	**4.94 (4.83-5.05)**	**4.68 (4.58-4.77)**	5.66 (5.32-6.00)	5.67 (5.29-6.04)	3.94 (3.62-4.27)	4.51 (4.17-4.85)
Work hours	**4.56 (4.37-4.74)**	**4.00 (3.82-4.18)**	**4.61 (4.49-4.73)**	**4.38 (4.27-4.48)**	5.41 (5.04-5.78)	5.34 (4.93-5.75)	4.86 (4.50-5.21)	5.49 (5.13-5.86)
JSS	**5.54 (5.43-5.65)**	**5.17 (5.07-5.28)**	**5.14 (5.07-5.21)**	**5.00 (4.94-5.06)**	5.64 (5.42-5.86)	5.53 (5.29-5.77)	5.35 (5.14-5.56)	5.45 (5.23-5.66)

Table 3 **GLM on estimated means, controlled for gender and age, of the ten JSS items (each scored from 1 to 7) among doctors in different type of work in the longitudinal sample in 2010 and 2016-17. Statistically significant differences (95% CI do not overlap) are in bold**

	General practitioners means (95 % CI)		**Specialists in private practice** means (95 % CI)		**Doctors in hospital** means (95 % CI)	
Satisfied with ….	2010 (n=94)	2016-17 (n=94)	2010 (n=22)	2016-17 (n=22)	2010 (n=233)	2016-17 (n=233)
Amount of responsibility given	5.35 (5.09-5.61)	4.87 (4.57-5.18)	5.35 (5.20-5.50)	5.21 (5.03-5.39)	5.96 (5.55-6.36)	5.82 (5.18-6.46)
Variation in work	5.84 (5.61-6.07)	5.92 (5.73-6.10)	5.41 (5.27-5.55)	5.44 (5.29-5.59)	5.05 (4.91-5.48)	5.27 (4.72-5.83)
Colleagues and fellow workers	5.95 (5.74-6.16)	5.87 (5.67-6.08)	5.63 (5.50-5.77)	5.58 (5.54-5.82)	5.73 (5.32-6.13)	5.68 (4.99-6.37)
Physical working conditions	5.68 (5.46-5.90)	5.70 (5.48-5.93)	4.75 (4.58-4.92)	4.90 (4.73-5.06)	5.86 (5.38-6.35)	5.91 (5.35-6.47)
Opportunities to use abilities	5.87 (5.65-6.10)	6.03 (5.85-6.21)	5.52 (5.38-5.65)	5.56 (5.40-5.71)	5.77 (5.42-6.12)	6.14 (5.53-6.74)
Overall job satisfaction	5.95 (5.77-6.13)	5.70 (5.51-5.90)	6.05 (5.70-6.40)	5.96 (5.35-6.56)	5.54 (5.42-5.66)	5.44 (5.30-5.58)
Freedom to choose method of work	5.75 (5.55-5.95)	5.48 (5.27-5.69)	6.05 (5.63-6.46)	5.91 (5.30-6.52)	4.98 (4.82-5.14)	4.96 (4.80-5.13)
Recognition for good work	5.40 (5.16-5.65)	5.15 (4.89-5.41)	5.50 (5.09-5.92)	5.77 (5.20-6.34)	4.91 (4.74-5.09)	4.79 (4.61-4.98)
Rate of pay	5.47 (5.24-5.70)	5.16 (4.90-5.42)	5.91 (5.52-6.30)	6.00 (5.44-6.56)	4.97 (4.79-5.14)	4.90 (4.74-5.06)
Work hours	4.49 (4.19-4.79)	3.92 (3.59-4.24)	5.46 (4.89-6.02)	5.63 (5.04-6.24)	4.52 (4.34-4.70)	4.48 (4.30-4.76)
JSS	5.58 (5.42-5.73)	5.38 (5.23-5.53)	5.73 (5.52-5.95)	5.81 (5.32-6.30)	5.16 (5.06-5.26)	5.14 (5.03-5.25)

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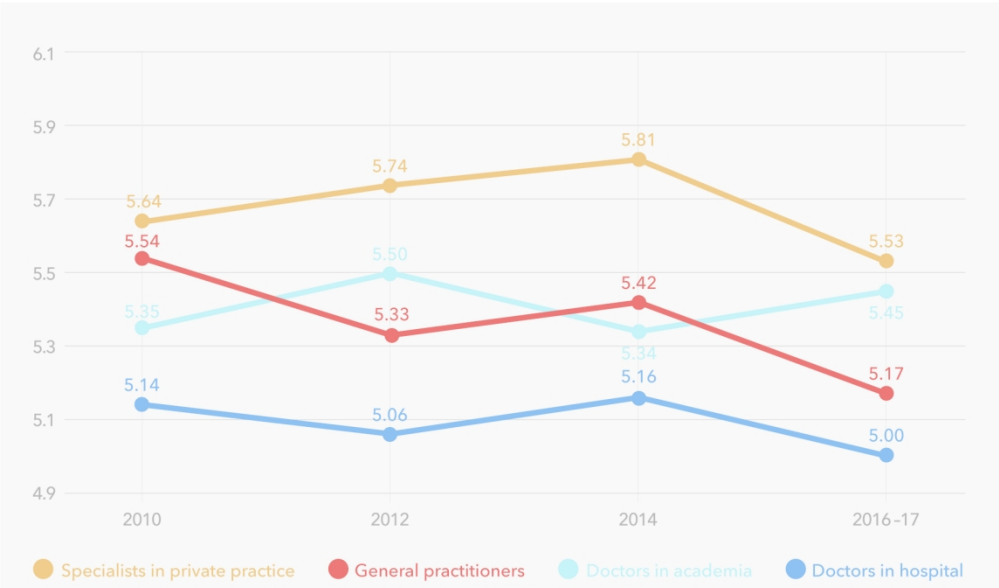
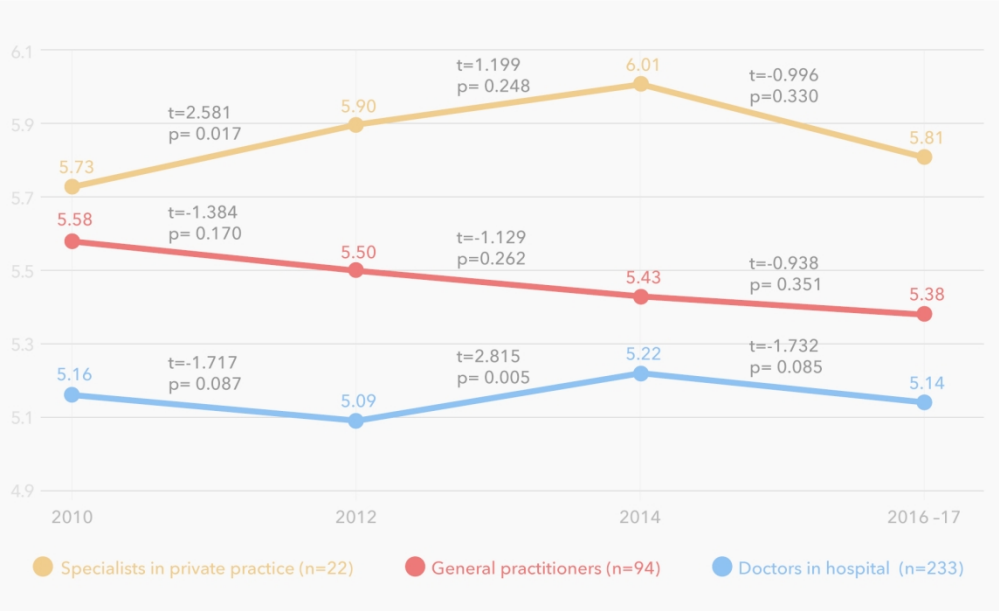


	2010 mean (95 % CI)	2012 mean (95 % CI)	2014 mean (95 % CI)	2016-17 mean (95 % CI)
General practitioners	5.54 (5.43-5.65)	5.33 (5.23-5.44)	5.42 (5.31-5.54)	5.17 (5.07-5.28)
Doctors in hospital	5.14 (5.07-5.21)	5.06 (5.00-5.12)	5.16 (5.09-5.23)	5.00 (4.94-5.06)
Specialists in private practice	5.64 (5.42-5.86)	5.74 (5.52-5.95)	5.81 (5.59-6.03)	5.53 (5.29-5.77)
Doctors in academia	5.35 (5.14-5.56)	5.50 (5.30-5.70)	5.34 (5.12-5.55)	5.45 (5.23-5.66)

GLM estimated means of job satisfaction (scored from 1 to 7) controlled for age and gender among doctors in different job positions in 2010, 2012, 2014 and 2016-17



GLM estimated means of job satisfaction (scored from 1 to 7) controlled for age and gender among doctors in different job positions in 2010, 2012, 2014 and 2016-17 with paired t-tests (the longitudinal subsample)

STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*
Checklist for cohort, case-control, and cross-sectional studies (combined)

Manuscript ID bmjopen-2018-027891: Changes in job satisfaction among doctors in Norway from 2010 to 2017.A study based on repeated surveys
Judith ROSTA, Olaf G. AASLAND, Magne NYLENNA

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any pre-specified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	6
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7-9
Bias	9	Describe any efforts to address potential sources of bias	17
Study size	10	Explain how the study size was arrived at	6 and Table 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	9
		(*c*) Explain how missing data were addressed	9

		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10 and Table 1
		(b) Give reasons for non-participation at each stage	10 and Table 1
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10
		(b) Indicate number of participants with missing data for each variable of interest	10 and Table 1
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	N/A
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	N/A
		Cross-sectional study—Report numbers of outcome events or summary measures	11
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11-12 and Figure 1, 2 and Table 2, 3
		(*b*) Report category boundaries when continuous variables were categorized	N/A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	11-12 and Table 2, 3
Discussion			
Key results	18	Summarise key results with reference to study objectives	13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	13-15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	N/A

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.