

Sickness absence among young and middle-aged workers in Norway: The impact of a population-level intervention

Therese Nordberg Hanvold (✉ tno@stami.no)

National Institute of Occupational Health

Petter Kristensen

National Institute of Occupational Health

Karina Corbett

Norwegian Institute of Public Health

Rachel Louise Hasting

National Institute of Occupational Health

Ingrid Sivesind Mehlum

National Institute of Occupational Health

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Abstract

Background The study objective was to evaluate the impact of a population-level intervention (the IA Agreement) on the reduction of sickness absence (SA) among young and middle aged workers in Norway.

Methods Using an observational design we conducted a quasi-experimental study to analyse registry data on individual SA for all employed individuals in 2000 (n=298 690) and 2005 (n=352 618), born in Norway between 1976 and 1967. The intervention of interest was the tripartite agreement for a more inclusive working life (the IA Agreement). We estimated difference in pre-post differences (DID) in SA between individuals working in IA companies with the intervention and companies without, in 2000 and 2005. We used logistic regression models and present odds ratios (DID OR) with accompanying 95% CI. We stratified analyses by sex, industry and company size.

Results. We found no significant impact on the overall risk of sickness absence after implementing the intervention among young and middle aged workers. Stratified by sex, the intervention resulted in a slight decrease in SA among female workers (DID OR 0.93 (0.91-0.96)) while the intervention showed no impact among male workers (DID OR 1.01 (0.97-1.06)). We found that companies signing the IA Agreement were large companies (≥ 50 employees) often within the manufacturing and health and social sectors. In large manufacturing companies, we found a reduction in SA among workers both in companies with and without the intervention, resulting in no statistically significant impact of the actual IA intervention on SA. In large health and social companies, we found an increase in SA among workers both in companies with and without the intervention. The increase was smaller among the workers in companies offering the IA intervention compared with workers in companies without, resulting in a positive impact of the actual IA intervention in the health and social industry. This impact was statistically significant only among female workers.

Conclusions The results indicate that the impact of the IA Agreement on SA varies considerably depending on sex and industry. These findings suggest that reducing SA may warrant industry-specific interventions.

Background

Sickness absence (SA) remains a significant problem globally with both a financial and health burden for societies and individuals. In Norway, the level of sickness absence (SA) is considered relatively high compared to neighbouring countries (1). Consequently, reducing SA is an important political objective and initiatives with this aim have received significant attention. One such initiative was introduced in 2001, where the employer organizations, employee organizations, and the Government signed the Tripartite Agreement for a More Inclusive Working Life (the IA Agreement). The IA Agreement's three main goals were to reduce SA, secure recruitment of people with disabilities and vulnerable groups into the labour market, and prolong working life (2). The IA Agreement can be considered a population-level "intervention", where companies voluntarily signed an IA Agreement with the Norwegian Labour and Welfare Administration (NAV). Signing an IA Agreement granted access to consulting services and subsidies to assist the companies' work on reducing sickness absence and increasing work participation. This "intervention" is a large societal investment constituting a major cost, as the budget for one year of these services has been estimated to be 38 million euros (3). The Agreement has been renewed five times, most recently in December 2018 for the period 2019–2022. Its latest renewal entails an expansion meaning that the IA Agreement comprises all of Norway's companies and employees. It also entails a clearer focus on reducing SA and decreasing the withdrawal from work life. Despite this expansion, there is still a lack of effect-focused studies on its impact (4). There have been previous non-scientific evaluations of the intervention, but these have seldom

taken into account the heterogeneity between companies with and without the IA Agreement, such as company size and industry (3, 5, 6). Moreover, the few scientific studies assessing the IA Agreement's effectiveness have given contradictory results. Two studies showed no impact on SA (7, 8), while more recent studies, using causal inference methods, found positive impacts with a higher probability of returning to work (9) and a lower likelihood of receiving a full disability pension (10). These studies are, however, done on selected samples, such as participants on work rehabilitation (9) and older employees aged 50–61 (10), highlighting the need for studies on other samples/cohorts.

In the present observational study, we have access to data on all individuals born in Norway between 1967 and 1976, their individual-level SA, and the IA status of the company they work in pre and post intervention period (2000 and 2005). These data provide an opportunity to examine the IA Agreement's impact on achieving the goal to reduce SA in a young/middle aged population of workers (age span 24–38 years during follow-up). This is an especially important group to examine, as SA early in working life is associated with later SA and thus lower work participation (11). By linking individual-level data from several registers with company-level data on the IA status and using a quasi-experimental design, our aim was to evaluate the impact of this population-level intervention on SA. The assignment of companies and workers into the IA agreement or not was outside the control of the study and was registered retrospectively. We performed analyses stratified by sex, company size and industry, as previous evaluations showed that the distribution of company size and industry varies by IA status (3, 12), and that SA varies substantially between sex and industry (13). Distinguishing between possible different impacts of the intervention by industry and company size may assist future prioritizations of certain groups.

Methods

The IA Agreement in Norway, first introduced in 2001, is the population-level intervention of interest in this study. Using an observational design, we conducted a quasi-experimental study following recent guidelines on evaluating population health interventions (14). The intervention group (individuals working in companies with an IA Agreement) was compared with the control group (individuals working in companies without an IA Agreement) regarding their pre-post differences in SA in the study periods 2000 and 2005.

Data source

The data material comes from a cohort consisting of all individuals born in Norway between 1967 and 1976 ($n = 626\,928$). They have been identified through the national identification number in the Medical Birth Registry of Norway allowing for data linkage across several national registries. Background characteristics and data on SA and industry were available from Statistics Norway's events database on employment and welfare, FD-Trygd (15). National registries are updated either on an annual basis, or are event-history databases, in which case we have the precise dates of the events. In addition, we have obtained annual data from the registries of NAV on the companies' size and the companies' annual IA status. It was possible to link this information to the individuals' employment in a company with or without the IA Agreement.

Design and population

Figure 1 illustrates the design and a flowchart of the source population ($n = 626\,928$). The study population consisted of a 2000 sample and a 2005 sample of those employed and not on SA at the beginning of the year (2000: $n = 298\,690$, 2005: $n = 352\,618$). We compared the annual risk of SA in the pre period (year 2000) and the post period (year 2005) between those who worked in a company with an IA Agreement (intervention group) and

those who worked in companies without an IA Agreement (control group). The intervention period ranged from January 2001, to December 2004. Only those employed and not on SA on 1st January 2000 were included in the pre period (N = 466 538). Individuals were excluded if they worked in a company with missing information on IA status, were working in a company that had signed the Agreement after 2003, or had left the Agreement prior to 2005. Those present in both pre and post periods were excluded if they had changed from intervention to control group or vice versa. Of the initial population 36% (N = 167 848) were excluded according to these criteria. The study population in 2000 was comprised of 298,690 individuals, of which 105,081 were in the intervention group and 193,609 were in the control group. New individuals were included in 2005 if they were employed and not on SA on 1st January 2005; after applying the above exclusion criteria, this resulted in an additional 137,766 individuals and a total study population in 2005 of 352,618 individuals (125,360 in the intervention group and 227,258 in the control group).

Intervention (The IA Agreement)

Our independent variable measured whether the participants worked in a company that had signed the IA Agreement in the period 2001–2003. We considered signing the Agreement in 2004 or later as too late in terms of evaluating the impact on SA in 2005. Signing an IA Agreement gives the companies access to funding of both individual interventions, to retain employees at work during illness, and group-based preventative interventions. The interventions include opportunities for tighter and earlier follow-up of workers with SA, increased use of graded sickness certification, and access to subsidies for work adjustments. Furthermore, IA companies have access to “NAV working life centres” that assist companies in their strategic work related to the goals of the IA Agreement (1). Thus, signing the IA Agreement can be seen as a proxy for initiating specific interventions to prevent SA among the company's employees. The NAV data enabled classification of the treatment and control groups by identifying employees working in companies with and without an IA Agreement on an annual basis. The IA Agreement status (intervention assignment) was therefore not at the discretion of the researcher.

Outcome (Sickness absence)

SA data were obtained from the event database FD-Trygd, which records all physician-diagnosed SA spells lasting > 16 calendar days. Employees in Norwegian companies receive full salary from the employer during certified SA. NAV reimburses the employer for absences lasting > 16 calendar days, and these absence spells are registered in the database; therefore, registration is considered to be complete for employees. We obtained individual records on SA spells for the periods January 1st to December 31st of 2000 and 2005 and calculated one year risk of one or more SA spells for 2000 and 2005, separately.

Covariates

Data on sex and year of birth were obtained from the Medical Birth Registry of Norway.

Information on industry was obtained from Statistics Norway's FD-Trygd database on an annual basis and was coded according to the Standard Industrial Classification 2002 (15). This classification has a hierarchical, top-down structure that begins with general characteristics and narrows down to more specific job areas. The first two digits of the code represent the major industries to which a company belongs (16). In this study we have identified 13 industries; 1 Agriculture/forestry A/B), 2 Mining/quarrying (C), 3 Manufacturing (D), 4 Electricity, gas and water supply (E), 5 Construction (F), 6 Wholesale and retail (G), 7 Hotel and restaurant work (H), 8 Transport and storage

(I), 9 Financial and real estate (J/K), 10 Public administration (L), 11 Education (M), 12 Health and social work (N), 13 Other community and social work (P/Q).

Data on company size were obtained from the registers of NAV on an annual basis and divided in three different groups: (i) small companies (0–10 employees), (ii) medium-sized companies (11–49 employees) and (iii) large companies (> 50 employees).

Statistics

We estimated the one year risk of SA during the pre-intervention period (year 2000) and post-intervention period (year 2005). No information was available on the specific interventions used in the companies; thus, our analysis evaluates the total impact of working in a company that has signed the Agreement and possibly started offering workplace interventions to reduce employees' SA. We used the difference-in-difference (DID) method, which can account for fixed unobserved individual differences. The counterfactual method inherent in DID allows us to evaluate the SA for the control group IF they hypothetically had received the treatment/intervention and is thus a reflection of the change in the intervention group due to the intervention.

We calculated pre-post differences between the intervention and the control group. The impact of the IA Agreement on SA was estimated as the difference in pre-post differences (differences between 2005 and 2000) between the IA and non-IA groups, using logistic regression models (17). The Odds Ratios (DID OR) with accompanying 95% confidence intervals (CI) are presented and the statistical significance level was set at a p-value < 0.05. An OR value < 1.0 indicates that the additive difference in SA risk between 2005 and 2000 ($\text{risk}_{2005} - \text{risk}_{2000}$) in the intervention group is lower than the corresponding figure in the control group. This is referred to as a positive impact of the intervention on SA.

The DID method has a strong common trend assumption, namely that the intervention and control groups would have followed the same trajectory had the intervention not taken place. This was checked through comparing SA with common trend graphs in a period prior to the intervention (1998–2000) and the assumption was considered satisfied (see Supplementary Fig. 1).

We also estimated the marginal effect, where the percentage point (PP) indicates a positive impact of the intervention if the number is negative. A negative impact of the intervention on SA is shown by an OR value > 1.0, and indicates that the additive difference in SA risk in 2005 and 2000 ($\text{risk}_{2005} - \text{risk}_{2000}$) in the intervention group is higher than the corresponding figure in the control group. In the marginal effect estimates, this is indicated as a positive number.

Based on earlier studies evaluating the IA Agreement, we know that it was unlikely that the intervention and control group would be similar in all manners. We therefore stratified the analyses by sex, industry and company size. To ensure statistical power in the adjusted analyses, only industries with > 2000 employees in each group (control and intervention) for both years (2000 and 2005) were included. This led to subgroup analyses in manufacturing, construction, wholesale/retail, transport/storage, financial/real estate, public administration, education and health/social work. STATA/SE 14.0 Software was used for analyses (STATA Corporation, College Station, Texas, U.S.A). The study was approved by the Regional Committees for Medical and Health Research Ethics (REK).

Results

Table 1 shows that the mean age of employees in companies with and without an IA Agreement was similar, however, the two groups differed when it came to important variables such as sex, company size and industry. A higher proportion of employees in companies with IA Agreement were female (58%) and working in large companies (70%). They were most commonly employed in health/social work (35%), manufacturing (15%) and education (14%). Employees in the control group, on the other hand, were most commonly employed in wholesale/retail (26%), financial and real estate (18%) and manufacturing (14%). They were more evenly distributed between small (28%), medium-sized (37%), and large companies (34%). The two groups also differed when it came to SA, as the employees in companies signing the IA Agreement had a 3 percentage point (PP) higher SA prior to the intervention compared with employees in control companies (16.9% and 13.9%, respectively). See Table 1 for more study population characteristics.

Figure 2A and 2B show the risk of SA in the control and treatment groups for women and men, respectively, and for the period pre and post IA Agreement. From 2000 to 2005, we found an overall increase in SA among women in both the intervention (21.4% to 22.8%) and control group (18.0% to 20.4%). Men showed no changes in SA in either the intervention (10.8 % to 10.5%) or the control group (10.6% to 10.1%). Among women, accounting for the differences in SA at baseline, and despite the increase in SA for both intervention and control group, a significant positive impact of having an IA Agreement was found (OR 0.93, CI 0.91 – 0.96). Among men, however, when taking into account the differences in the SA at baseline, no significant impact of the IA Agreement was found (OR 1.01, CI 0.97 – 1.06). Figure 2C and 2D show the risk of SA in the control and treatment group for women and men, respectively, by company size. Figure 2C suggests that there is a positive impact of the IA Agreement for women in large and medium-sized companies; even though SA increases in both the control and intervention groups, it increases more in the control group than the intervention group. For men, a negative impact of the IA Agreement was found in large companies; even though the SA decreases in both the control and intervention groups, it decreases more in the control group than the intervention group.

Our evaluation of the impact of the Norwegian Agreement for a More Inclusive Working Life shows no significant impact on the overall risk of SA after implementing the intervention. In this period, from 2000 to 2005, we found an overall increase in SA in both the intervention (16.9% to 17.6%) and control group (13.9% to 14.4%). The results, however, show that the impact of the implemented intervention varied by industry and company size. In Figure 3 we present the estimated impact of the IA Agreement for large companies in eight selected industries, for men and women separately. This is a choice based on the available sample size; see Supplementary Table 1 for estimates for all company sizes. In large companies in the health and social work sector we found a positive impact of the IA Agreement for both women and men. For the large companies in the wholesale/retail sector and the transport sector, we found an impact for men but not for women. Conversely, for large companies in the financial/real estate and public administration sectors, we found an impact for women but no impact for men. In large manufacturing companies, no impact of the Agreement in for women or men was found. In both the construction and educational sector, we similarly found no impact on SA.

In Table 2, we present the impact of the IA Agreement adjusted for company size and industry. For women the Agreement had an overall significant positive impact, decreasing SA by 1.3 PP. For the different industries, our results indicate a positive impact of the IA Agreement among female workers in large companies in the public administration sector (11.1 PP decrease in SA) and medium sized wholesale and retail companies (2.5 PP decrease in SA). The results also show that the IA Agreement decreases the SA in female employees working in the health and social work sector, ranging from 2.3 PP for employees in medium companies to 3.2 PP for employees in large companies. For male workers, our results only showed a significant positive impact of the IA Agreement among

workers in large wholesale and retail companies (2.6 PP decrease in SA). There was a significant negative impact in large companies in the construction and public administration sectors (3.1 PP and 2.1 PP increase in SA, respectively).

Discussion

In summary, we found no significant impact on the overall risk of SA the first 4 years after implementing the Norwegian Agreement for a More Inclusive Working Life. When stratifying by sex, there was an overall positive effect of the IA Agreement among female workers, whilst no effect was found among male workers. Companies signing the Agreement were more likely to be large (≥ 50 employees) and were more often within the manufacturing and health and social work sectors. In large manufacturing companies, there was a statistically significant reduction in SA among both male and female workers after the implementation of the IA Agreement, in both intervention and control companies; thus no impact was found for the intervention. In large health and social companies there was, in contrast, an increase in SA after the introduction of the IA Agreement. The increase was lower in the intervention group compared to the control group, resulting in a positive impact of the actual IA intervention on SA. This pattern was mainly evident among female workers in large health and social companies. In sum, the results indicate that the impact of the IA Agreement on SA varied considerably depending on sex, industry, and company size.

Methodological considerations

One of the strengths of this study is the use of statistical analyses that take into account the difference in SA pre and post intervention. Difference-in-difference analysis is a causal inference method that can be applied to counter selection bias and confounding. The large study population also made it possible to stratify by sex, industry and company size. This stratification, in combination with the DID analyses, could therefore reduce the bias and confounding that may result from the significant differences in the distribution of company size, industry and sex between the intervention and control groups. However, self-selection bias may be an issue, as we observed that the employees in companies signing the IA Agreement had a higher SA prior to the intervention, compared with employees in control companies. This might challenge the key assumption of exogeneity in DID, which posits that the selection into the intervention (the Agreement) should not be predicted by the outcome (SA) prior to the intervention. However, there is no evidence that individuals choose where they work based on the company's IA status, and the companies do not only base their choice of signing the IA Agreement on prior SA level (18).

One of the many challenges in evaluating the IA Agreement's impact on SA was that we did not have data on exactly when the IA Agreement was signed by a specific company (only yearly data). We did not have data on when they started introducing the different preventive measures, either. Other studies have shown, however, that most companies signing the Agreement increased their effort to lower SA following the start of the IA Agreement in 2001, regardless of the date they formally signed the Agreement (5). Even so, the specific preventive actions or activities they may offer is not available in our data, preventing us from evaluating the possible differential impact of activities on SA. To address this, we have used company size as a proxy measure as this can indicate differences in the means or resources they have available to use in implementing the IA activities, applying for grants and so on. Larger companies may have more resources available to make use of and benefit from the possibilities in the IA Agreement more than small companies.

Another limitation of this study is the focus on SA alone as the outcome, as the IA Agreement incorporates three goals that might influence each other. Reducing SA is only one of the goals. The two other goals are to secure recruitment of people with disabilities and vulnerable groups into the labour market and to prolong working life. These three goals may affect each other, as a company that increases the recruitment of people with disabilities and prolongs working life for older workers, might also experience increased SA due to this. It is therefore possible that we may present an underestimation of the impact of the intervention on SA in our study for companies with a high goal attainment on inclusion of disabled workers, but this is unknown. It is therefore important to have in mind that our results are only evaluating one of the goals of the IA Agreement.

Our results in light of other findings

Our finding that the impact of the IA Agreement on SA varied considerably depending on sex and industry contributes to limited literature on the impacts of this population based intervention. Evaluations of the IA Agreement have been published in some reports without peer review (5, 6, 19, 20), and have indicated a positive impact of the IA Agreement in manufacturing, as this sector shows a decrease in SA after implementation of the intervention. Earlier reports have also indicated a negative impact of the intervention in the health and social work sector, as SA increases in this sector in the same period (5). Our results were therefore a bit surprising as we found the opposite; there was no impact of the IA Agreement in manufacturing, and a positive impact in health and social work. These contradicting results can be explained by the fact that we use an analytical method that takes into account the intervention and control group differences, both before the IA Agreement was implemented and 4 years after. This explanation is strengthened by the fact that we get similar findings (decrease in SA for employees in manufacturing companies and increase in SA for employees in health and social work companies) when we use the same statistical methods as in the reports, without the use of DID method.

Similar to a 2011 study on the impact of the IA Agreement on SA (7), our results also show no impact in the overall sample. However, in contrast, we find that the impact varies by industry. This may partly be explained by the considerably smaller sample in the 2011 study, which impedes stratification by industry. In their analysis, they also used office workers as a reference, and did not include information on company size or take into account the baseline difference in SA. Another study by Midsundstad et al from 2014 showed, on the other hand, a positive impact of the intervention on overall SA and a varying effect by industry (8). They used the same DID method as in our study and found a positive impact on SA among IA companies in the public administration sector. This is partially in line with our findings; however, in our study, the positive impact in the public administration sector was only found in women and varied according to company size. They also did not find positive impacts of the intervention for manufacturing, construction and transport; although the overall SA decreased in manufacturing, it was not due to the intervention, which is also similar to our findings. This can indicate that the decrease in SA may be related to other factors than the IA Agreement, for example company characteristics or the focus on SA and work environment in the manufacturing sector as a whole, resulting in an impact for all companies and not only those signing the IA Agreement. We also found a positive impact among female health and social workers in medium and large companies, which was not found in the other study (8). A potential reason for this discrepancy in results may be that they focused on older workers (aged 50+) whilst our study included younger and middle-aged workers (aged 25–34). Beyond these two studies, there is little scientific knowledge on the impact of the IA Agreement on SA that also takes into account the possible differential impacts by industry. Other scientifically based evaluations of the IA Agreement have been carried out, largely reporting a positive impact, however, they have evaluated other outcomes, such as disability benefits (10) and return to work after rehabilitation (9), and are therefore not comparable to our study.

Implications

The present study strengthens the evidence that the impact of the IA Agreement on SA varies greatly between industries and the size of the companies. Very few clear implications can be given based on this study, as we do not have data on the preventive measures used in different sectors. It is, however, evident that there is a need for a greater focus on work- and industry-related exposures and the possibilities for preventive measures addressing the specific challenges in each industry. Previous studies have found that 23–28% of long-term SA is attributable to work-related exposures (21, 22). This indicates that interventions targeting the work environment can be considered an important method for decreasing SA. According to the surveillance of work environment for the working population in Norway (13), health and social workers have challenges in terms of high emotional demands, role conflicts, job strain, unwanted sexual attention, violence and threats, working nights, neck bending, and awkward lifting. In contrast, manufacturing workers have more exposure to noise, vibrations, awkward lifting, squatting/kneeling, downsizing, and job insecurity. This may indicate that reducing SA in these two sectors would warrant different preventive strategies and actions.

The IA Agreement has up until now, been focused on close follow up of those on sick leave, adjustments of work tasks and the possibility to get other tasks that the employee can do even when sick. It can also be argued that the differences in impact of the intervention can be due to the fact that the reason for SA will in most cases depend on the workplace, work tasks and opportunities for adjustments. In some industries, the possibilities to adapt the work tasks are more limited than in others, such as manual workers in manufacturing compared with office workers in public administration.

Conclusion

This study provides knowledge on the differential impacts of the IA Agreement on SA by sex, industry and company size. The results indicate that the preventive measures may require adaptation to the specific challenges faced by the industry. The data available, however, gives us no possibility to interpret which of the IA activities are effective. Future research should therefore obtain data that can more precisely reflect IA activity at the company level and focus on evaluating specific preventive measures, as some measures may have more impact on SA than others.

Declarations

Ethics approval and consent to participate

The regional ethical committee (REC South East A, reference number S-06028a) approved the study.

Consent for publication

Not applicable as the data is from national registries.

Availability of data and materials

The data that support the findings of this study are available from Statistics Norway`s event database on employment and welfare (FD-Trygd), in addition to data from The Norwegian Labor and Welfare Administration (NAV). Restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

The article was conceived by TNH, ISM and PK. TNH and Karina Corbett conducted the data structuring and data cleaning. TNH also conducted all analysis. ISM, PK and RLH contributed to analytic design, and to the interpretation of results. TNH drafted the manuscript with feedback from all authors. All authors contributed to the final draft of the manuscript.

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List Of Abbreviations

CI – Confidence Interval

DID – Difference- in- Difference

IA – Inclusive working life Agreement

NAV – The Norwegian Labour and Welfare Administration

OR – Odds Ratio

PP – Percentage Point

REK – The Regional Committees for Medical and Health Research Ethics

SA – Sickness Absence

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Tables

Table 1. Descriptive statistics for employees in companies with an Intervention (IA) and employees in companies without an intervention, Controls (Non-IA)

	2000				2005			
	Intervention		Control		Intervention		Control	
	N=105,081 (35.2)		N=193,609 (64.8)		N=125,360 (35.5)		N= 227,258 (64.5)	
	N	%	N	%	N	%	N	%
Age								
Mean (SD)	28.9 (2.8)		28.5 (2.8)		33.7 (2.8)		33.6 (2.8)	
Sex								
Female	60,959	58	85,691	44	72,318	58	93,777	4
Company size								
Small (0-10 employees)	4,572	4	53,915	28	5,761	5	68,449	32
Medium (11-49 employees)	26,384	25	70,529	37	33,122	26	84,858	39
Large (≥50 employees)	73,000	70	65,152	34	86,474	69	63,985	29
Industry								
Agriculture/forestry (A,B)	277	0.3	3,635	2	414	0.3	3,344	2
Mining/quarrying (C)	1,195	1	2,054	1	1,964	2	3,328	2
Manufacturing* (D)	15,873	15	27,439	14	16,142	13	28,517	13
Electricity, gas and water supply (E)	588	0.6	815	0.4	1,195	1.0	2,482	1
Construction* (F)	4,493	4	16,267	8	4,866	4	23,282	10
Wholesale and retail* (G)	4,761	4	50,969	26	4,617	4	50,723	22
Hotel and restaurant work (H)	1,668	2	10,306	5	1,106	1	6,560	3
Transport and storage* (I)	6,602	6	13,933	7	7,156	6	16,898	8
Financial and real estate* (J/K)	6,068	6	35,051	18	7,305	6	41,016	18
Public administration* (L)	9,915	9	2,276	1	13,232	11	6,488	3
Education* (M)	15,096	14	5,153	3	21,100	17	8,028	4
Health and social work* (N)	36,449	35	16,203	8	46,752	35	25,776	11
Other community and social work (P/Q)	2,066	2	9,421	5	2,380	2	10,261	5
Sickness absence								
SA (risk of sickness absence spell >16 days duration)	17,804	17	26,921	14	22,034	18	32,708	14

*Industrial sectors selected in analyses

Table 2. Adjusted difference-in-difference estimates of the impact of the IA agreement on the risk of sickness absence, by sex, industry and company size.

	WOMEN			MEN		
	DID	(95%CI)	Effect#	DID	(95%CI)	Effect#
	OR		PP	OR		PP
All*	0.93	(0.91 – 0.96)	-1.1	1.01	(0.97 - 1.06)	0.1
All**	0.92	(0.89 – 0.95)	-1.3	1.02	(0.96 - 1.08)	0.2
Manufacturing (D)	1.01	(0.90- 1.13)	0.2	1.02	(0.93- 1.12)	0.2
Small (0-10 employees)	0.57	(0.18 – 1.84)	-8.4	0.32	(0.04 – 2.44)	-10.9
Medium (11-49 employees)	0.90	(0.78 – 1.04)	-1.6	1.04	(0.75 – 1.43)	0.4
Large (≥ 50 employees)	1.07	(0.93 – 1.24)	1.3	1.07	(1.00 – 1.16)	0.8
Construction (F)	1.81	(1.43 – 2.29)	6.4	1.16	(0.92 – 1.46)	1.8
Small (0-10 employees)	0.95	(0.39 – 2.31)	-0.5	2.20	(1.01 – 4.79)	8.7
Medium (11-49 employees)	2.83	(1.32 – 6.08)	10.7	1.04	(0.85 – 1.27)	0.5
Large (≥ 50 employees)	1.25	(0.51 – 3.06)	2.9	1.28	(1.09 – 1.50)	3.1
Wholesale and retail (G)	0.96	(0.86 – 1.08)	-0.6	0.89	(0.76 – 1.06)	-1.0
Small (0-10 employees)	1.02	(0.77 – 1.33)	0.2	1.49	(0.93 – 2.40)	3.4
Medium (11-49 employees)	0.86	(0.75 – 0.97)	-2.5	0.98	(0.81 – 1.19)	-0.1
Large (≥ 50 employees)	0.99	(0.68 – 1.44)	-0.1	0.76	(0.62 – 0.93)	-2.6
Transport and storage (I)	1.12	(0.98 – 1.27)	1.9	0.96	(0.86 – 1.06)	-0.5
Small (0-10 employees)	0.72	(0.32 – 1.62)	-4.8	0.21	(0.45 - 1.02)	-15.6
Medium (11-49 employees)	1.11	(0.81 – 1.54)	1.7	1.49	(1.19 – 1.86)	4.7
Large (≥ 50 employees)	1.13	(0.99 – 1.28)	2.2	0.88	(0.61 – 1.12)	-1.5
Financial/real estate (J/K)	0.85	(0.72 – 0.98)	-2.3	1.08	(0.94 – 1.24)	0.4
Small (0-10 employees)	2.24	(1.36 – 3.69)	10.7	1.06	(0.32 – 3.55)	0.3
Medium (11-49 employees)	1.09	(1.01 – 1.17)	1.2	0.93	(0.64 – 1.35)	-0.4
Large (≥ 50 employees)	0.65	(0.60 – 0.71)	-6.2	1.15	(0.84 – 1.59)	0.8
Public administration (L)	0.73	(0.65 – 0.83)	-4.8	1.12	(0.84 – 1.49)	0.7
Small (0-10 employees)	1.62	(0.62 – 4.21)	6.6	2.63	(1.19 – 5.84)	6.9
Medium (11-49 employees)	0.90	(0.57 – 1.44)	-1.5	1.31	(0.55 – 3.08)	2.0
Large (≥ 50 employees)	0.50	(0.34 – 0.72)	-11.1*	1.40	(1.05 – 1.84)	2.1
Education (M)	1.03	(0.89 – 1.89)	0.5	0.91	(0.73 – 1.14)	-0.8
Small (0-10 employees)	1.44	(0.94 – 2.23)	5.2	1.57	(0.52 – 4.68)	3.0
Medium (11-49 employees)	0.93	(0.71 – 1.20)	-1.2	0.81	(0.52 – 1.24)	-1.3
Large (≥ 50 employees)	1.13	(0.94 – 1.35)	1.8	1.16	(0.84 – 1.60)	0.8
Health and social work (N)	0.98	(0.93 – 1.04)	-0.3	0.92	(0.76 – 1.11)	-0.8
Small (0-10 employees)	0.97	(0.84 – 1.10)	-0.5	1.00	(0.62 – 1.60)	0.0
Medium (11-49 employees)	0.88	(0.81 – 0.95)	-2.3	0.96	(0.63 – 1.46)	-0.3
Large (≥ 50 employees)	0.84	(0.79 – 0.89)	-3.2	0.88	(0.66 – 1.18)	-1.1

DID: Difference-in-difference OR: Odds Ratios CI: Confidence Interval PP: Percentage Point (%)

All analyses adjusted for age. *Unadjusted. **Adjusted for company size and industry # Average Marginal Effect

Figures

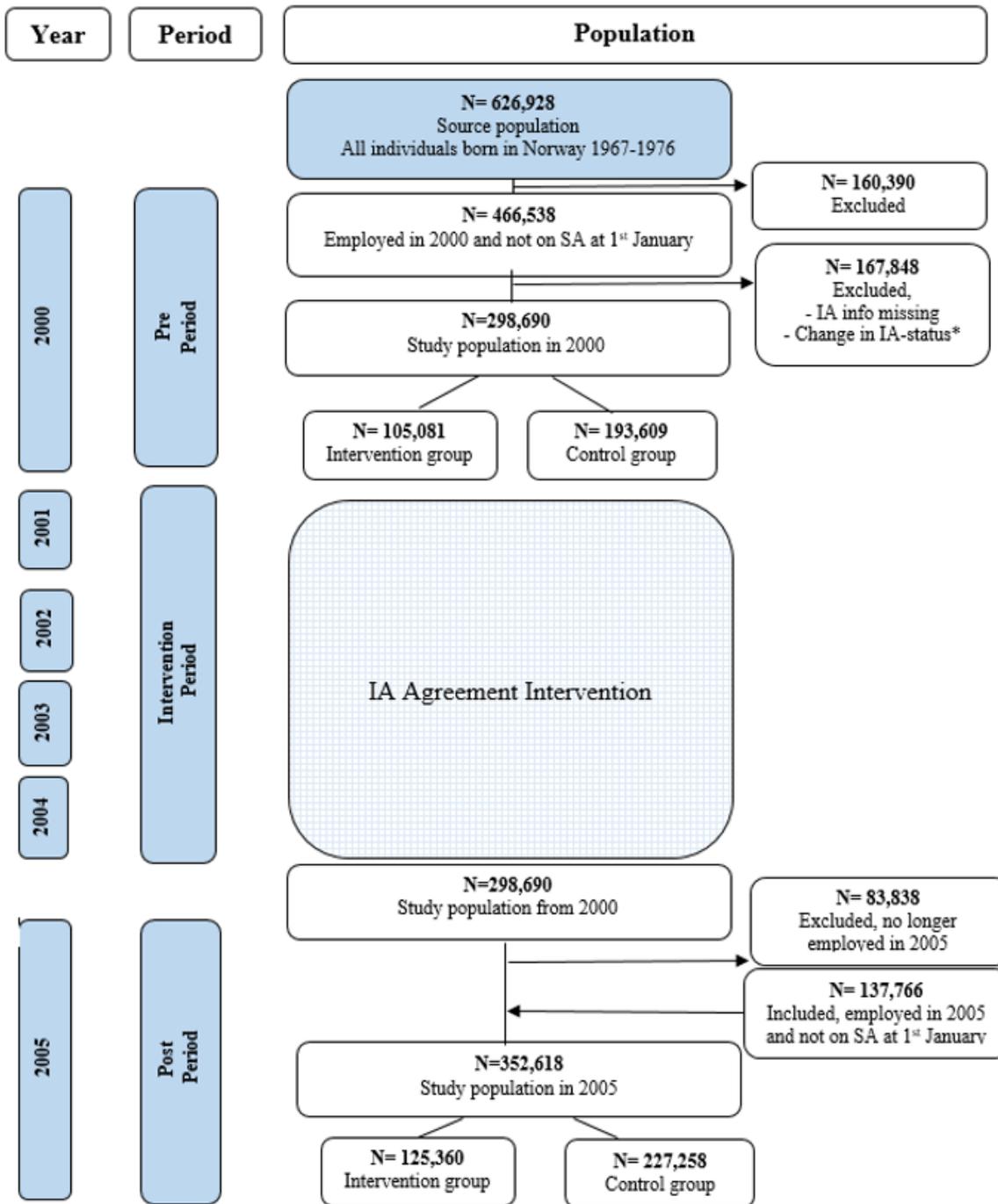
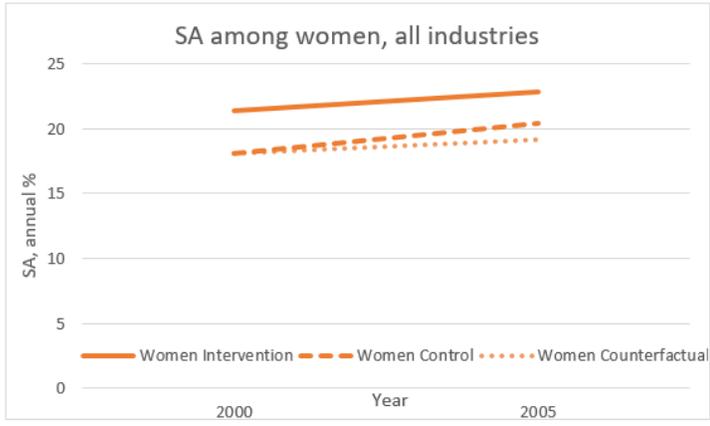


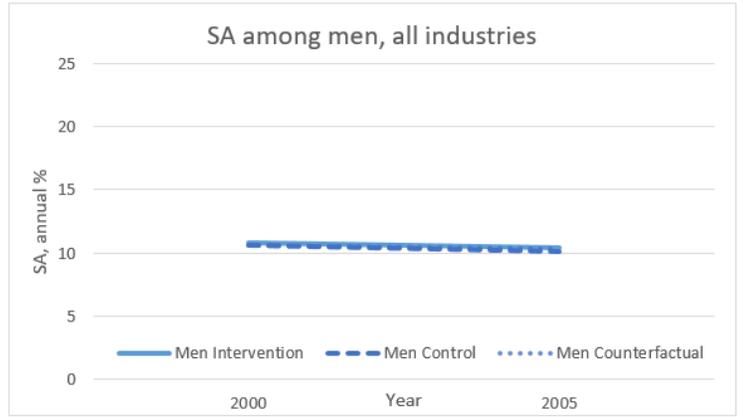
Figure 1

Flowchart, showing study population and intervention *Excluded if they had missing information of IA status or was working in a company that had signed the IA Agreement after 2003 or a company had left the IA Agreement prior to 2005. For those present in both years were excluded if they had changed from intervention to control group or vice versa.

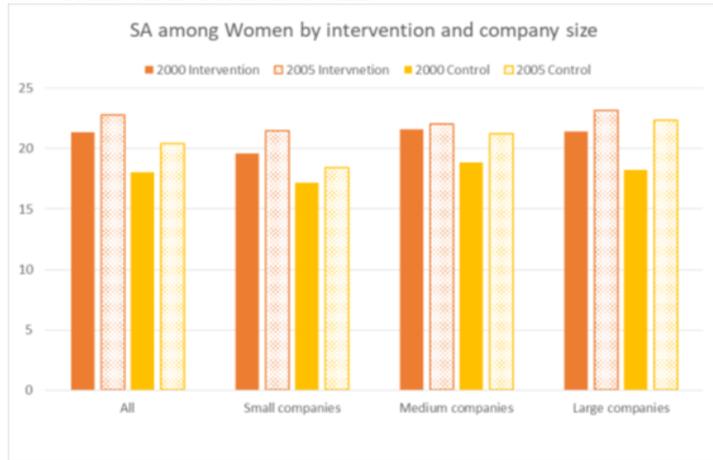
A. WOMEN



B. MEN



C. WOMEN AND COMPANY SIZE



D. MEN AND COMPANY SIZE



Figure 2

SA in intervention and control group by sex and company size

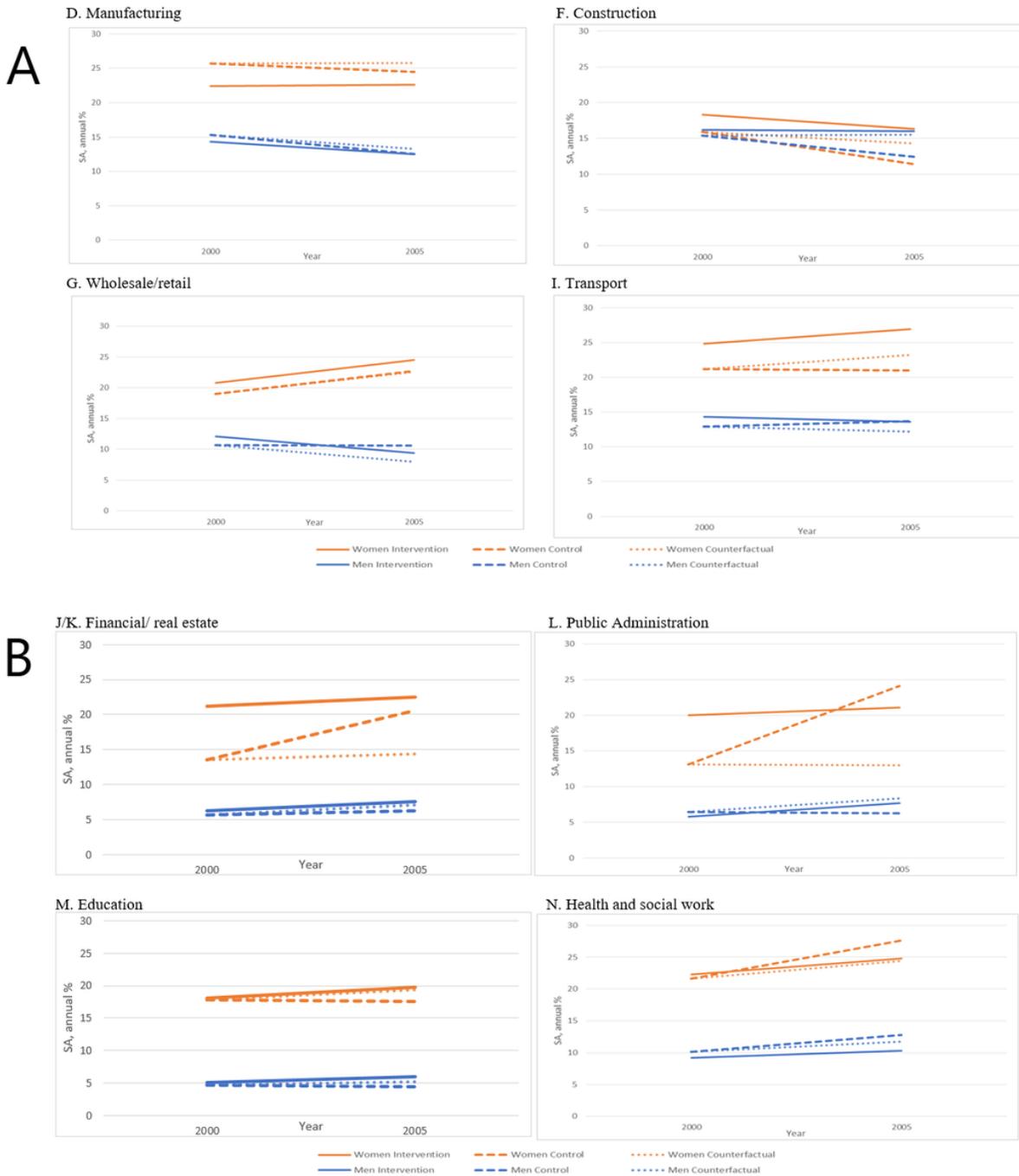


Figure 3

SA in intervention and control groups in large companies (≥ 50 employees), by selected industries and sex

Supplementary Files

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