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Sickness absence as a risk factor for low perceived social support at work among employees in the general population: a retrospective cohort study

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ABSTRACT

Objective

Though sickness absence often is a process over time, most studies have treated the phenomenon as a discrete event and focused on its causes more than the consequences. We aimed to examine whether various patterns of previous long-term sickness absence predicted current low perceived social support at work.

Method

This is a retrospective cohort study based on data from a population-based survey among Swedish employees (*n*=2,646). The survey data was linked to official registries yielding data on sickness absence one to seven years prior to the survey.

Results

The main finding was that previous sickness absence predicted low perceived social support at work. The highest odds for low social support were found among those who had a stable high level of sickness absence. Our two indicators of perceived social support studied were somewhat differently predicted by previous sickness absence: Recency of absence showed to be of importance for general support at the workplace and the relationship with colleagues and superiors. Experiencing that the immediate superior rarely or never regards their view was on the other hand mainly related to having had a high level of sickness absence, irrespective of recency.

Conclusions

As the first study to address this issue, our results indicate that recency and level of previous sickness absence may affect perceived social support at work. The study also points to the need of more research using individual repeated measurements.

Strengths and limitations of this study:

- Previous research have demonstrated that social support at work predicts sickness absence, but this is the first study to explore how previous sickness absences predict current perceived social support at work.
- The participants were drawn from the general population, and included employees across different work settings.
- Information on previous sickness absence was based on seven years of registry information. This minimizes problems with attrition and response bias, allows examination of both timing and extent of previous sickness absence in relation to current social support.
- Social support was only measured at one time point, precluding adjustments for baseline status as well as investigating degree of stability in perceived social support at work. We recommend further studies with use of individual repeated measurements.
- As with other population-based surveys, non-participation and selective participation remains a challenge, with lower participation-rates in the current study among men, younger individuals, those with lower incomes and those born outside the Nordic countries.

INTRODUCTION

In many cases, sickness absence is a process over time that may carry its own consequences for the individual.(1) Prolonged and repeated sickness absence is a precursor for future sickness absence (2), unemployment, work termination(3) and disability pension,(4, 5) and the associations cannot be explained by deterioration in health only.(6) Sickness absence can mean deprivation of an important social arena, with social marginalisation, isolation and exclusion as possible results.(7-9) Two Swedish studies have found long-term sickness absentees to report far more negative consequences of their sickness absence than positive ones, such as negative effects on health, sleep, mental wellbeing,(8) salary, career possibilities and zest for work.(9) The vast majority of studies on sickness absence have however treated the phenomenon as a discrete event, and aimed to identify its causes more than the consequences.(1)

Social support affects health(10) and social support at work is one of the work characteristics extensively studied in relation to sickness absence. Albeit an employee's relationships with colleagues and superiors can be considered to be more formal than the relations to family and friends, the social network at work can be an important source of support for the employee, especially considering the hours spent at work and the importance of work in Western societies.(11, 12) Low support is found to be associated with later sickness absence studies across several cohorts,(13-16) is observed in both public and private sector(17) and generally regarding support from co-workers as well as superiors.(18-20) Experiencing justice and fairness, for instance through experiencing being listened to by ones immediate superior, is another aspect of social support found associated with being on sickness absence.(21) Social support is also relevant for employees returning to work after being off sick.(22, 23)

There is an increased awareness on the possible reversed or reciprocal relationship between work conditions and health, i.e. that health through various mechanisms might influence work characteristics or that these factors affect each other bi-directionally.(24) A recent review study concluded that the relationship between job demand-control-support and job-related wellbeing might partly be reciprocal or reverse,(25) and a four-wave study found evidence for a reciprocal causal relationship between work characteristics, including social support and mental health.(26) Studies challenging a unidirectional relationship between social support and sickness absence are scarce. One Swedish study found that long-term absentees often reported that their absence affected their sense of belonging to the workgroup negatively, especially if full-time absent.(9) The cross-sectional design of that study however precludes making inferences about the temporal relationship between work absence and social inclusion at work.

In summary, few have examined patterns of sickness absence and their correlates. It is possible that sickness absence sets negative social processes in motion and that these difficulties add to the troubles causing the sickness absence in the first place and challenges returning to and retaining work. To increase understanding of these social processes, the overall aim of this study is to examine whether various patterns of previous long-term sickness absence predicts current low perceived social support at work. We will include two measures of social support at work and explore the relevance of sub-items of the social support scale employed.

METHOD

Study design and participants

This is a retrospective cohort study linking data from the Health Assets Project (HAP) survey in 2008 to official registries of sickness absence one to seven years prior to the HAP survey. HAP was specifically designed to gain knowledge about the influence of individual, organizational and societal factors on health, sickness absence and return to work. The target population in HAP was individuals aged 19-64 in Västra Götaland in Western Sweden, a region with both urban and rural areas and a population of 1.6 million (17% of the Swedish population). More details about HAP are described elsewhere.(27) A random sample was extracted from Statistics Sweden April 2008 (*n*=7,984) and invited to participate. Data was collected using registered data and a postal questionnaire including items on socio-demographic factors, physical and mental health, issues concerning sickness absence, work and family conditions, life events, leisure and lifestyle. The participation rate was 50.4% (*n*=4,027). A dropout analysis showed a significant higher dropout rate in the youngest age group (19-30 years of age), those with the lowest income level (≤ 149,000 SEK), as well as amongst those born outside the Nordic countries. In the present study, we excluded those younger than 23 years of age in 2008 (*n*=277), those reporting not being employed when participating in the survey (*n*=1090) and those registered with sickness compensation in 2008 who did not answer any of the items regarding social support (*n*=14). The final study sample was *n*=2,646.

Measures

Predictor: Sickness absence history 2001-2007

Using personal identification numbers, survey data were linked to the "Longitudinal integrated database for sickness insurance and labour market research", Statistics Sweden (LISA) records on sickness absence. In the Swedish insurance system, the employer covers sickness benefit the first 14 days of a sickness absence spell (except one qualifying day), thereafter benefits are granted from the Social Insurance Agency and registered in LISA. For those without employment, the sickness benefit is paid and registered from day two. LISA comprises information on an individual's total number of registered sickness absence days per year. Some participants (n=86) were granted sickness compensation or activity compensation one or more of the years after this benefit arrangement was established in 2003. As these benefits are awarded for severe and lasting work disability, we coded the number of absence days as full time sickness absence (365 days) for the calendar year a person received a sickness or activity compensation benefit. Missing data on sickness absence on one or more of the follow-up years (n=65), for instance due to immigration or individuals out of work life studying, was handled by multiple imputation.

Based on this information from the LISA-register, we constructed groups with different patterns of previous sickness absence to relate them to current perceived social support. The groups were constructed from observations in an initial exploratory latent class analysis, and further informed by the goal of creating meaningful categories, and to retain reasonable group sizes for statistical power. We therefore split the follow-up period from 2001 to 2007 into a "distant" (2001-2004) and "recent" (2005-2007) period. For each period, the participant's total number of registered sickness absence days was calculated. Again for each of the periods, the participants were coded as low ("0") or high ("1") by a median split on the total sickness absence days. This allowed us to construct the following five mutually exclusive categories: 1) "no absence"; no registered sickness absence during the whole

period, 2) “stable low”; a total number of sickness absence days below the median in both of the periods, 3) “distant high”; above median in the “distant” period, and below the median in the recent; 4) “recent high”; below the median the “distant” period, and above the median in the “recent”, and finally, 5) “stable high”; above the median on number of sickness absence days in both the “distant” and the “recent” period.

Outcome: Social support at work 2008

Two measures of perceived social support were employed; a workplace social support indicator and a question on immediate superior support.

First, a workplace social support indicator was constructed from the support subscale in the Swedish Demand-Control-Support Questionnaire (DCSQ).(28) The scale is based on Johnson and Halls’ model (11) and focus on the atmosphere at work. The participants were asked to what extent they agreed (agree; agree to some extent; disagree to some extent; disagree) to the following six statements: “*There is a calm and pleasant atmosphere at my workplace”; “There is good collegiality at work”; “My colleagues are there for me”; People at work understand that I can have a bad day”; I get along well with my superiors”; “I get along well with my colleagues”.* Answers were coded 1-4 and summarized, giving a scale from 6-24 were a higher score denoted higher social support (Cronbach’s α=0.86). The scale is found to have satisfactory psychometric properties.(29) A principal component analysis supported a one-factor solution in our data. Due to non-normal distribution and in order to identify high versus low level of social support, the total score was split by the median. A sensitivity analysis was performed, treating the scale continuously in log-transformed regression analyses, which gave similar results. In addition, sub –analyses were performed

keeping each of the single-items as separate outcomes to explore which aspects of support were most relevant in relation to sickness absence history (dichotomized, low support operationalized as responding disagree to some extent or disagree).

Second, we included a single-item measure on immediate superior support; *"Does your immediate superior consider your views?"* (Yes, frequently; yes, sometimes; no, rarely; no, never/almost never; no, I don't have a manager). Answers were dichotomized, giving a high (yes, frequently; yes, sometimes) and a low (no, rarely; no, never/almost never) support group. Participants responding that they did not have a superior were excluded from the analyses regarding this outcome (*n*=6).

Demographic variables.

The following demographic factors were extracted from Statistics Sweden: Gender (male, female), age (23–34, 35–44, 45– 54, 55–64 years), gross income (SEK ≤149 000, 150 000–299 000, ≥300 000) and occupational class (unskilled–skilled manual, low–intermediate non-manual, higher non-manual and entrepreneurs). Level of education (elementary or less, upper secondary and higher) and type of employment (temporary, permanent) was self-reported.

Analyses

All analyses were performed in Stata 12. Initially, differences in background characteristics (gender, age group, income level, occupational class, education level and type of employment) between employees with different sickness absence histories were examined using chi-square tests. Further, median (IQR) days per year of previous sickness absence were calculated. In the latter calculations individuals on sickness and activity compensation during

follow-up were excluded, as we did not have their exact number of absence days registered. Then we examined whether each of the two social support outcomes could be predicted by previous sickness absence, building multivariate logistic regression models. For both models, we first tested for crude associations, before including candidate confounders (gender, age, income, occupational class, education, type of employment). Only variables found related to both exposure and outcome in the data ($p<.05$) were included as confounders in the model (age in social support scale; age, education and occupational class for immediate superior support outcome). Finally, to explore the relevance of different aspects of social support, we performed sub-analyses where we treated each of the sub-items of the social support scale as separate outcomes.

We employed multiple imputations to handle missing data using the multivariate normal model procedure in Stata 12, with 20 cycles of imputation. All variables reported in the study in addition to variables on health and wellbeing were included as auxiliary variables to perform the imputation, where missing responses were substituted by predictions based on valid responses from all other variables (see table 2 for magnitude of internal missing per variable). The variables were subsequently rounded to the original scale to enable multi-nominal regression analyses, and Allison's(30) recommended procedure was followed for nominal variables with more than two categories.

RESULTS

Characteristics of employees with different sickness absence histories

The total sample was *n*=2646, whereof 55.2% were women and mean (SD) age was 45.1 (11.2). Of these, 1535 (59.5%) had no registered sickness absence in the follow-up periods. Of those 1046 who had at least one episode of sickness absence during the seven years period prior to the survey, 521 (20.2%) were categorized as having a "stable low" absence pattern, 198 (7.7%) as "distant high", 150 (5.8%) as "recent high", and finally 177 (6.9%) were categorised as "stable high" (see operationalization in method section). Median (IQR) sickness absence days per year in the first (2001-2004) and second (2005-2007) follow-up periods were as follows in the groups: "Stable low": first period 6(19)/second period 1(16); "distant high": 127(197)/0(9); "recent high": 0(7)/177 (259); "stable high" 212.5 (299)/277.5 (366).

The proportion of women was higher in the groups with sickness absence than in the group with no sickness absence, especially "distant high" and "stable high". Mean age was highest in the "stable high" group and lowest in the "no absence" group. The groups with sickness absence had lower levels of education, occupational class and income than the "no absence" group. There was on the other hand no association between employment type and history of sickness absence (table 1).

Table 1 Description of employees in a general working population sample with different histories of registered sickness absence (2001-2007)

	No absence *n*=1535	Stable low *n*=521	Distant high *n*=198	Recent high *n*=150	Stable high *n*=177
Gender (%)**					
Women	48.6	62.2	71.2	64.0	71.8
Age (mean (SD))**	44.1(11.4)	45.8(10.7)	47.5(10.5)	46.9(11.1)	50.4(0.4)
Level of education (%)**					
Higher education	45.3	33.6	33.8	34.7	33.3
Upper secondary	41.6	42.6	42.9	46.0	35.6
Elementary or less	12.6	22.3	22.2	18.7	30.5
Missing	0.5	1.5	1.0	0.7	0.6
Occupational class (%)**					
Higher non-manual, Entrepren.	22.8	10.6	15.2	10.7	10.2
Intermediate - low non-manual	43.5	39.2	36.9	44.0	37.3
Skilled - unskilled manual	32.2	48.2	46.5	44.0	49.2
Missing	1.6	2.1	1.5	1.3	3.4
Income (%)**					
≥300 000 SEK	41.2	29.0	27.3	27.3	17.5
150 000-290 000 SEK	49.3	63.9	62.6	68.0	73.4
≤149 000 SEK	9.5	7.1	10.1	4.7	9.0
Form of employment (%)					
Permanent job	91.7	91.6	90.4	91.3	90.4
Temporary job	7.2	7.3	8.1	7.3	8.5
Missing	1.1	1.2	1.5	1.3	1.1

Bivariate associations examined using chi-square tests for categorical and Anova for continuous variables. Missing responses are handled using pairwise deletion.
No absence: No registered sickness absence days (SA, i.e. beyond 14 days) during the follow-up period 2001-2007.
Stable low: SA below the median split 2001-2007.
Distant high: SA above the median split 2001-2003 and below the median split 2004-2007.
Recent high: SA below the median split 2001-2003 and above the median split 2004-2007.
Stable high: SA above the median split 2001-2007.
**p<.001

Current low perceived overall social support at work predicted by different sickness absence histories

Those having a "recent high", "stable high" and "stable low" sickness absence history had increased odds for reporting low overall level of perceived social support at work compared to those without a history of sickness absence. Effects were somewhat higher for the two former than for the latter group albeit with overlapping confidence intervals (crude OR=1.7, 95%CI

1.2-2.4; OR=1.5, 95%CI 1.1-2.1; and OR=1.3, 95%CI 1.0-1.5, respectively). Adjusting for confounders hardly altered the effect sizes. There was no difference in social support between those in the "distant high" group and those with no sickness absence (table 2).

Table 2 Effect of previous sickness absence on current low perceived social support at work and immediate superior support. Logistic regression analyses, crude and adjusted models

Sickness absence history		Low social support		Low superior support	
		OR	95% CI	OR	95% CI
Stable low	Crude	1.3	1.0-1.5	1.0	0.7-1.4
	Adjusted	1.3	1.0-1.5	0.9	0.7-1.3
Distant high	Crude	1.1	0.9-1.6	2.1	1.4-3.1
	Adjusted	1.1	0.8-1.5	2.0	1.3-3.1
Recent high	Crude	1.7	1.2-2.4	1.8	1.1-2.9
	Adjusted	1.7	1.2-2.4	1.8	1.1-2.9
Stable high	Crude	1.5	1.1-2.1	2.0	1.3-3.1
	Adjusted	1.5	1.1-2.1	2.1	1.3-3.3

Each sickness absence history group is contrasted to those with no registered sickness absence (reference group).
No absence: No registered sickness absence days (SA, i.e. beyond 14 days) during the follow-up period 2001-2007
Stable low: SA below the median split 2001-2007.
Distant high: SA above the median split 2001-2003 and below the median split 2004-2007.
Recent high: SA below the median split 2001-2003 and above the median split 2004-2007.
Stable high: SA above the median split 2001-2007.
Adjusted for age in analysis on social support index as outcome, and adjusted for age, education and work class in the analysis on low immediate superior support.
Missing responses handled using multiple imputations.

Current perceived low immediate superior support predicted by different sickness absence histories

Having a "distant high", "recent high" or "stable high" sickness absence history gave increased odds for reporting that their immediate superior rarely or never consider their views,

compared to having no previous sickness absence (adjusted OR=2.0, 95%CI 1.3-3.0; OR=2.0, 95%CI 1.3-3.2; and OR=1.8, 95%CI 1.2-2.8, respectively). There was no difference between the "stable low" group and those with no history of sickness absence (table 2).

Aspects of perceived current social support at workplace predicted by different sickness absence histories

When analysing each single item of perceived social support separately, the "stable high" group followed by the "recent high" had the overall highest odds for experiencing low social support, albeit with overlapping confidence intervals compared to the effects of the other sickness absence groups. These two were also the only groups significantly predicting the items *"I do not get along well with my superiors"* and *"I do not get along well with my colleagues"* (table 3). The item with the overall highest effect size across sickness absence groups was *"My colleagues are not there for me"* (table 3), while the single association with the highest effect size was between the "stable high" group and the item "*There is not good collegiality at work"* (OR=3.1, 95%CI 2.0-4.7). The "distant" group showed non-significant associations to all items except the item *"There is not a calm and pleasant atmosphere at my workplace"* (table 3).

Table 3 Effect of previous sickness absence patterns (2001-2007) on single-items on current social support at work (2008). Logistic regression analysis, age adjusted

	There is not a calm and pleasant atmosphere at my workplace		There is not good collegiality at work		My colleagues are not there for me		People at work do not understand that I can have a bad day		I do not get along well with my superiors		I do not get along well with my colleagues	
Sickness absence history	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Stable low	1.2	1.0-1.6	1.6	1.2-2.2	2.2	1.6-3.2	1.4	1.0-1.8	1.1	0.8-1.7	1.5	0.9-2.3
Distant high	1.8	1.3-2.6	1.4	0.8-2.2	1.3	0.7-2.3	1.0	0.6-1.6	1.2	0.7-2.2	0.9	0.4-2.1
Recent high	1.6	1.1-2.4	1.6	0.9-2.7	2.7	1.6-4.6	1.2	0.7-2.1	1.9	1.1-3.3	2.4	1.2-4.5
Stable high	2.5	1.8-3.6	3.1	2.0-4.7	2.6	1.6-4.3	1.7	1.1-2.6	1.9	1.1-3.3	2.5	1.4-4.5

For all outcomes, the odds of responding "agree to some extent" or "agree" to the given items are calculated. Each sickness absence history group is contrasted to those with no registered sickness absence (reference group). Missing responses handled using multiple imputations.
No absence: No registered sickness absence days (SA, i.e. beyond 14 days) during the follow-up period 2001-2007.
Stable low: SA below the median split 2001-2007.
Distant high: SA above the median split 2001-2003 and below the median split 2004-2007.
Recent high: SA below the median split 2001-2003 and above the median split 2004-2007.
Stable high: SA above the median split 2001-2007.

DISCUSSION

Main results

The main finding of this study was that previous sickness absence predicted low perceived social support at work. The highest odds for low social support were found among those who had a stable high level of sickness absence. Interestingly, our two indicators of perceived social support were somewhat differently predicted by previous sickness absence; while recency of absence showed to be of importance for general support at work and relationship with colleagues and superiors, experiencing low immediate superior support was mainly related to having had a high level of sickness absence, irrespective of recency.

Strengths and limitations

One of the main strengths of this study was the linkage between a population-based health survey and registries of sickness absence up to seven years prior to the survey. The many and comparable data points on sickness absence enabled including both the time aspect as well as amount of previous sickness absence in our analyses. Only a handful of studies have examined the impact of having a history of sickness absence, even fewer have taken the time aspect into consideration. The use of register data on sickness absence minimizes problems with attrition and response bias. Gathering data on exposure and outcome from different sources further decreased the risk of response bias. The social support scale is a commonly used instrument in Scandinavia and is found to have good psychometric properties.(29) Finally, the general population design allowed studying employees across different work settings, increasing generalizability of the results.

The following limitations also need to be considered. As with other population-based surveys, non-participation and selective participation remains a challenge, with lower participation-rates in the current study among men, younger individuals, those with lower incomes and those born outside the Nordic countries.

A key limitation is that social support only was measured at one time point, precluding adjustments for baseline status as well as investigating degree of stability in support at work. Low social support at baseline might have contributed to elevated sickness absence in the first place, as demonstrated in several studies.(13-15, 18) Nonetheless, our data on sickness absence goes back seven years from the time point measuring social support at work. If our results indicate that employees had problems regarding social support at work seven years back already, the results arguably pinpoint a central issue regarding sickness absence. The study may also be considered a first step to investigate the possible bidirectional or reciprocal causal relationship of the much more studied association between social support at work and sickness absence.(24) Further studies employing a multi-wave design are suggested to examine the quality of the association, like degree of reciprocity, in more detail.

Immediate superior support was measured employing a single item with unknown psychometric properties, and should be interpreted with caution. A factor analysis merging the item with the support scale supported a one-factor solution, however the item was in general less correlated with the other items than the correlations between the items in the established scale (data not shown). Further, the two measures aim at different theoretical constructs, the former regarding atmosphere(28) and the latter fairness/justice/participation at the workplace.(31) To not distort the quality of the scale, and to explore various aspect of social support, we chose to analyze the single item separately.

The measure of previous sickness absence was rather crude, including the total number of registered sickness absence days (beyond 14 days if employed) per year. One should hence be cautious generalizing our results to patterns of shorter spells, as analyses of more fine-tuned fluctuations in sickness absences might show different qualities and correlates. Being able to detect significant differences between the sickness absence groups using a crude measure increase our confidence in that a true association exists between previous sickness absence and social support at work.

From July 2003 till December 2004 the employer-covered period were extended from 14 till 21 days in Sweden,(32) yielding slightly different inclusion criteria for LISA registration during this period compared to the rest of the follow-up period. A sensitivity analysis, excluding data from 2003 and 2004, did however not change the overall findings (data not shown).

The relationship between sickness absence and social support might show different patterns between men and women, as found in some studies examining the opposite direction of this association.(13, 14, 18) Small sickness absence groups constrained the use of gender-stratified or interaction analyses. There were no differences in social support between men and women in the data, suggesting that gender differences do not explain the associations found. Gender differences can however not be ruled out, and considering the high sickness absence rate among women, further studies specifically investigating explanations for this gender gap are warranted.

Interpretation

This is the first study that we know of to examine the association between previous sickness absence and current perceived social support at the workplace in a longitudinal design. The results add to the small literature illustrating that a unidirectional approach to the relationship between psychosocial work conditions and measures of health, like sickness absence, is inadequate.(25, 26) The findings further harmonize with Sieurin's descriptive study,(9) which showed that many long-term absentees, especially those full-time absent, experienced that their absence negatively affected their sense of belonging to the workgroup. We did not differentiate between full-time and part-time absence in our study. Nonetheless, the odds for low perceived social support at work were generally higher for those with a high level of absence than for those with lower levels of absence. This difference may suggest that keeping some contact with the workplace during sickness absence is beneficial to maintain social inclusion at work, whilst acknowledging that the expedience of contact may vary e.g. with cause of absence.(33) Social support at work might also be seen as part of the push and pull factors that motivates an individual to be present or absent from work.(34) We can only speculate about the wider consequences of the negative impact of sickness absence on social support at work as suggested by our results. A conceivable consequence is that it contributes to negative processes that increase risk of lasting work exclusion by challenging return to work or contributing to further episodes of sickness absence.

While a high level of absence in the recent years predicted current low perceived social support at work, a high level of absence some years ago did not. This may indicate a time aspect in the association. One explanation of this "time effect" is that the association between recent absence and social support reflects an effect of ongoing work conditions on sickness absence, as examined and found in previous studies.(e.g. 20) However, a sensitivity analysis censoring those

on sickness absence on time of participation only reduced the effect sizes to some extent, leaving this interpretation only partly supported by the data (data not shown). An alternative interpretation is that sickness absence actually affect social support at work, but only if the absence is relatively recent: First, sickness absence can add strain on co-workers, thereby draining their goodwill and this problem may increase with length of sickness absence, as described by co-workers themselves in a Swedish qualitative study.(35) Such interpretation further fits well with the results showing that the single-item with the overall highest effect-size across pattern of previous sickness absence was experiencing that the colleagues were not there for them. The finding illustrates that the relationship with colleagues may be highly relevant to take into account in return to work processes after long-term absences.(35) Second, the non-significant association between the "distant high" sickness absence group and current perceived social support could mean that these have sorted out their situation, especially regarding their colleagues, either through successful social reintegration or by changing work place or task. More studies are required to replicate our finding and to gain better understanding for how sickness absence can affect social inclusion at work.

Experiencing that the immediate superior rarely or never regarded one's view did on the other hand not depend on recency, but on whether one had a history with high level of sickness absence at all. This could partly be a result of a downward selection process, where those with a high level of absence drift towards less favorable jobs with lower opportunities for discretion.(36) Interestingly, the association between level of absence and immediate superior support was not explained by socio-demographic factors such as occupational class or income. Bearing in mind the possibility of residual confounding and the uncertainties regarding the use of a single item outcome, the finding could suggest that sickness absence have an independent effect on job status

or the experience of being treated with justice and fairness. The finding is worth further investigation, as there are promising results on the role of superior support in improving return to work: Though findings are not unequivocal across health conditions (23) and gender,(37) superior support is found to predict return to work in a systematic review on patients with low back pain (22) as well as in a controlled study on worker superior communication among long-term absentees due to burn out.(38)

Other factors than the sickness absence as such, like mental health factors and personality, might have contributed in the association between sickness absence and social support at work found in the current study. It could for instance be that workers with mental illnesses are at greater risk of low social support than workers with less stigmatized illnesses. Further, workers with depression and anxiety have described that that they tend to distort work tasks, which again may depreciate the relationship with colleagues.(39) The associations between social support and mental health, depression and personality are complex. Low perceived social support at work is found to be a risk factor for depression, but depression and negative affectivity may also affect a worker's perception of and interaction with their work environment.(40) Further, though results are inconclusive,(16) a partial reverse causation in the association between psychosocial working condition and mental wellbeing has been suggested.(25) The cross-sectional measurement of these variables restricted investigating these aspects in our study. Further studies, measuring each variable of interest at several time points, may clarify the mechanisms involved in more detail.

CONCLUSION

Results showed that both recency and level of previous sickness absence were related to current perceived social support at work. The findings illustrate that sickness absence may have negative

consequences for social inclusion at the workplace. Nevertheless, it does also point to the need of more research using individual repeated measurements, under which the impact of sickness absence for social inclusion and integration at work could be interesting to trace out in more detail.

Contributions

MK contributed in conception and design of the study, analyzed the data, interpretation of the data, drafted the manuscript and the consequent revisions regarding important intellectual content. KH, GH and SØ contributed in conception and design of the study, interpretation of the data, and critical revision of the manuscript for important intellectual content. All authors approved of the final version of the manuscript.

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Competing interest

None

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Ethics approval

Ethics Committee, University of Gothenburg, Sweden.

Data sharing

No additional data available.

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STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Completed
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	OK
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	OK
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	OK
Objectives	3	State specific objectives, including any prespecified hypotheses	OK
Methods			
Study design	4	Present key elements of study design early in the paper	OK
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	OK, most details given, in addition to a reference to a previous published article giving further details
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	OK
		(*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	Not applicable
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	OK
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	OK
Bias	9	Describe any efforts to address potential sources of bias	OK
Study size	10	Explain how the study size was arrived at	OK
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	OK
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for	OK

confounding	
(*b*) Describe any methods used to examine subgroups and interactions	OK
(*c*) Explain how missing data were addressed	OK
(*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	OK
(*e*) Describe any sensitivity analyses	OK

Continued on next page

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	OK
		(b) Give reasons for non-participation at each stage	OK
		(c) Consider use of a flow diagram	OK
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	OK
		(b) Indicate number of participants with missing data for each variable of interest	OK
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	OK
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	NA
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	NA
		Cross-sectional study—Report numbers of outcome events or summary measures	NA
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	OK
		(*b*) Report category boundaries when continuous variables were categorized	OK
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	OK
Discussion			
Key results	18	Summarise key results with reference to study objectives	OK
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	OK
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	OK
Generalisability	21	Discuss the generalisability (external validity) of the study results	OK
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	OK

*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.

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Previous sickness absence and current low perceived social support at work among employees in the general population: a historical cohort study

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Previous sickness absence and current low perceived social support at work among employees in the general population: a historical cohort study

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ABSTRACT

Objective

Though sickness absence often is a process over time, most studies have treated the phenomenon as a discrete event and focused on its causes more than the consequences. We aimed to examine whether various patterns of previous long-term sickness absence were associated with current low perceived social support at work.

Method

This is a historical cohort study based on data from a population-based survey among Swedish employees (*n*=2,581). The survey data was linked to official registries yielding data on sickness absence one to seven years prior to the survey.

Results

The main finding was that previous sickness absence was associated with current low perceived social support at work. The highest odds for low social support were found among those who had a stable high level of sickness absence. The two indicators of perceived social support employed were somewhat differently associated with previous sickness absence: Recency of absence showed to be of importance for general support at the workplace and the relationship with colleagues and superiors. Experiencing that the immediate superior rarely or never regards their view was on the other hand mainly related to having had a high level of sickness absence, irrespective of recency.

Conclusions

Our results indicate that recency and extent of previous sickness absence is related to perceived social support at work. Future research on the relationship between social support and sickness absence should use repeated measurements and acknowledge the possible bidirectional relationship.

Strengths and limitations of this study:

- This is the first study to explore how previous sickness absences are associated with current perceived social support at work.
- The participants were drawn from the general population, and included employees across different work settings.
- Information on previous sickness absence was based on seven years of registry information. This minimizes problems with attrition and response bias, allows examination of both timing and extent of previous sickness absence in relation to current social support.
- Social support was only measured at one time point, precluding adjustments for baseline status as well as investigating degree of stability in perceived social support at work.
- Participation-rates were lower among men, younger individuals, those with lower incomes and those born outside the Nordic countries.

INTRODUCTION

In many cases, sickness absence is a process over time that may carry its own consequences for the individual.(1) Prolonged and repeated sickness absence is a precursor for future sickness absence,(2) unemployment, work termination(3) and disability pension,(4, 5) and the associations cannot be explained by deterioration in health only.(6) Sickness absence can mean deprivation of an important social arena, with social marginalisation, isolation and exclusion as possible results.(7-9) Two Swedish studies have found long-term sickness absentees to report far more negative consequences of their sickness absence than positive ones, such as negative effects on health, sleep, mental wellbeing,(8) salary, career possibilities and zest for work.(9) The vast majority of studies on sickness absence have however treated the phenomenon as a discrete event, and aimed to identify its causes more than the consequences.(1)

Social support affects health(10) and social support at work is one of the work characteristics extensively studied in relation to sickness absence. Albeit an employee's relationships with colleagues and superiors can be considered to be more formal than the relations to family and friends, the social network at work can be an important source of support for the employee, especially considering the hours spent at work and the importance of work in Western societies.(11, 12) Low support is found to be associated with later sickness absence in studies across several cohorts,(13-16) is observed in both public and private sector(17) and regarding support from co-workers as well as superiors.(18-20) Experiencing justice and fairness, for instance through experiencing being listened to by ones immediate superior, is another aspect of social support found associated with being on sickness absence.(21) Social support is also relevant for employees returning to work after being off sick.(22, 23)

There is an increased awareness on the possible reversed or reciprocal relationship between work conditions and health, i.e. that health through various mechanisms might influence work characteristics or that these factors affect each other bi-directionally.(24) A recent review study concluded that the relationship between job demand-control-support and job-related wellbeing might partly be reciprocal or reverse,(25) and a four-wave study found evidence for a reciprocal causal relationship between work characteristics, including social support and mental health.(26) Studies challenging a unidirectional relationship between social support and sickness absence are scarce. One Swedish study found that long-term absentees often reported that their absence affected their sense of belonging to the workgroup negatively, especially if full-time absent.(9) The cross-sectional design of that study however precludes making inferences about the temporal relationship between work absence and social inclusion at work.

In summary, few have examined patterns of sickness absence and their correlates. It is possible that sickness absence sets negative social processes in motion and that these difficulties add to the troubles causing the sickness absence in the first place and challenges returning to and retaining work. To increase understanding of these social processes, the overall aim of this study is to examine whether various patterns of previous long-term sickness absence are associated with current low perceived social support at work in a longitudinal analysis. We will include two measures of social support at work and explore the relevance of sub-items of the social support scale employed.

METHOD

Study design and participants

This is a historical cohort study linking data from the Health Assets Project (HAP) survey in 2008 to official registries of sickness absence one to seven years prior to the HAP survey. HAP was specifically designed to gain knowledge about the influence of individual, organizational and societal factors on health, sickness absence and return to work. The target population in HAP was individuals aged 19-64 in Västra Götaland in Western Sweden, a region with both urban and rural areas and a population of 1.6 million (17% of the Swedish population). More details about HAP are described elsewhere.(27) A random sample was extracted from Statistics Sweden April 2008 (*n*=7,984) and invited to participate. Data was collected using registry data and a postal questionnaire including items on socio-demographic factors, physical and mental health, issues concerning sickness absence, work and family conditions, life events, leisure and lifestyle. The participation rate was 50.4% (*n*=4,027). A dropout analysis showed a significant higher dropout rate in the youngest age group (19-30 years of age), those with the lowest income level (≤ 149,000 SEK), as well as amongst those born outside the Nordic countries. In the present study, we excluded those younger than 23 years of age in 2008 (*n*=277), those reporting not being employed when participating in the survey (*n*=1090), those registered with sickness compensation in 2008 who did not answer any of the items regarding social support (*n*=14), and those with missing data on sickness absence one or more of the follow-up years 2001-2007 (*n*=65). The final study sample was *n*=2,581.

Measures

Predictor: Sickness absence history 2001-2007

Using personal identification numbers, survey data were linked to the "Longitudinal integrated database for sickness insurance and labour market research", Statistics Sweden (LISA) records on sickness absence. In the Swedish insurance system, the employer covers sickness benefit the first 14 days of a sickness absence spell (except one qualifying day), thereafter benefits are granted from the Social Insurance Agency and registered in LISA. For self-employed and those without employment (e.g. unemployed and students), the sickness benefit is paid and registered from day two. LISA comprises information on an individual's total number of registered sickness absence days per year. Some participants (*n*=86) were granted sickness compensation or activity compensation one or more of the years after this benefit arrangement was established in 2003. As these benefits are awarded for severe and lasting work disability, we coded the number of absence days as full time sickness absence (365 days) for the calendar year a person received a sickness or activity compensation benefit. We excluded those with missing data on sickness absence on one or more of the follow-up years (*n*=65), since many of these probably were out of risk for sickness absence due to migration. These cases were nonetheless at risk at least some of the follow-up years, and some missing could be caused by registration error and regarded random. To check robustness of our results, we run a sensitivity analysis where we included the cases and treated missing through multiple imputations. Results were similar across solutions (data not shown).

Based on the information from the LISA-register, we constructed groups with different patterns of previous sickness absence to relate them to current perceived social support. Initially, we performed exploratory latent class analyses (LCA), a statistical technique suitable for finding meaningful subgroups in a population that are similar e.g. in their growth trajectories.(28) Due to difficulties in including the subgroup with sickness compensation in

the LCA and low power due to small categories if excluding this subgroup, we chose to rather construct groups based on median splits, informed by the observations of the LCA; Firstly, as suggested from the LCA, we split the follow-up period from 2001 to 2007 into a "distant" (2001-2004) and "recent" (2005-2007) period. Then we calculated the participant's total number of registered sickness absence days for each period. Again for each of the periods, the participants' absence was coded as low ("0") or high ("1") by a median split on the total sickness absence days. This allowed us to construct the following five mutually exclusive categories (see table 1 for overview of categorization criteria): 1) "no absence"; no registered sickness absence during the whole period, 2) "stable low"; a total number of sickness absence days below the median in both of the periods, 3) "distant high"; above median in the "distant" period, and below the median in the recent; 4) "recent high"; below the median the "distant" period, and above the median in the "recent", and finally, 5) "stable high"; above the median on number of sickness absence days in both the "distant" and the "recent" period. The results employing the described grouping yielded similar results as with the more fine-tuned groupings complied through LCA (data not shown). The sickness absence patterns were in addition similar to those emerged from a previous published trajectory analysis (29).

Table 1. Categories of previous registered sickness absence 2001-2007.

Category	**Sickness absence during 2001-2003**	**Sickness absence during 2004-2007**
Reference	No sickness absence	No sickness absence
Stable low	Sickness absence **below** median split	Sickness absence **below** median split
Distant high	Sickness absence **above** median split	Sickness absence **below** median split

Recent high	Sickness absence **below** median split	Sickness absence **above** median split
Stable high	Sickness absence **above** median split	Sickness absence **above** median split

Outcome: Social support at work 2008

Two measures of perceived social support were employed; a workplace social support indicator and a question on immediate superior support.

First, a workplace social support indicator was constructed from the support subscale in the Swedish Demand-Control-Support Questionnaire (DCSQ).(30) The scale is based on Johnson and Halls' model(11) and focus on the atmosphere at work. The participants were asked to what extent they agreed (agree; agree to some extent; disagree to some extent; disagree) to the following six statements: "*There is a calm and pleasant atmosphere at my workplace"; "There is good collegiality at work"; "My colleagues are there for me"; People at work understand that I can have a bad day"; I get along well with my superiors"; "I get along well with my colleagues"*. Answers were coded 1-4 and summarized, giving a scale from 6-24 were a higher score denoted higher social support (Cronbach's α=0.86). The scale is found to have satisfactory psychometric properties.(31) A principal component analysis supported a one-factor solution in our data. Due to non-normal distribution and in order to identify high versus low level of social support, the total score was split by the median. A sensitivity analysis was performed, treating the scale continuously in log-transformed regression analyses, which gave similar results. In addition, sub –analyses were performed keeping each of the single-items as separate outcomes to explore which aspects of support were most relevant in relation to sickness absence history (dichotomized, low support operationalized as responding disagree to some extent or disagree).

Second, we included a single-item measure on immediate superior support; *"Does your immediate superior consider your views?"* (Yes, frequently; yes, sometimes; no, rarely; no, never/almost never; no, I don't have a manager). Answers were dichotomized, giving a high (yes, frequently; yes, sometimes) and a low (no, rarely; no, never/almost never) support group. Participants responding that they did not have a superior were excluded from the analyses regarding this outcome (*n*=6).

Demographic variables.

The following demographic factors were extracted from Statistics Sweden: Gender (male, female), age (mean), gross income (SEK ≤149 000, 150 000–299 000, ≥300 000) and occupational class (unskilled–skilled manual, low–intermediate non-manual, higher non-manual and entrepreneurs). Level of education (elementary or less, upper secondary and higher) and type of employment (temporary, permanent) was self-reported.

Analyses

We employed MPlus to perform the initial exploratory LCA analyses. The remaining analyses were performed in Stata 12. Initially, differences in background characteristics (gender, age group, income level, occupational class, education level and type of employment) between employees with different sickness absence histories were examined using chi-square tests and Anova. Further, median (IQR) days per year of previous sickness absence were calculated. In the latter calculations individuals on sickness and activity compensation during follow-up were excluded, as we did not have their exact number of absence days registered. Then we examined whether each of the two social support outcomes could be predicted by previous

sickness absence, building multivariate logistic regression models. For both models, we first tested for crude associations, before including candidate confounders (gender, age, income, occupational class, education, type of employment). Only variables found related to both exposure and outcome in the data ($p<.05$) were included as confounders in the model (age in social support scale; age, education and occupational class for immediate superior support outcome). Finally, to explore the relevance of different aspects of social support, we performed sub-analyses where we treated each of the sub-items of the social support scale as separate outcomes.

We employed multiple imputations to handle missing data using the multivariate normal model procedure in Stata 12, with 20 cycles of imputation. All variables reported in the study in addition to variables on health and wellbeing were included as auxiliary variables to perform the imputation, where missing responses were substituted by predictions based on valid responses from all other variables (see table 2 for magnitude of internal missing per variable). The variables were subsequently rounded to the original scale to enable multi-nominal regression analyses, and Allison's(32) recommended procedure was followed for nominal variables with more than two categories.

Ethics approval

The HAP study was approved by the Ethics Committee, University of Gothenburg, Sweden, registration number 039-08.

RESULTS

Characteristics of employees with various sickness absence histories

The total sample was *n*=2581, whereof 55.2% were women and mean (SD) age was 45.1 (11.2). Of these, 1535 (59.5%) had no registered sickness absence during the seven years follow-up period prior to the survey. Of those 1046 who had at least one episode of registered sickness absence in this period, 521 (20.2%) were categorized as having a "stable low" absence pattern, 198 (7.7%) as "distant high", 150 (5.8%) as "recent high", and finally 177 (6.9%) were categorised as "stable high" (see operationalization in method section). Median (IQR) sickness absence days per year in the first (2001-2004) and second (2005-2007) follow-up periods were as follows in the groups: "Stable low": first period 6(19)/second period 1(16); "distant high": 127(197)/0(9); "recent high": 0(7)/177 (259); "stable high" 212.5 (299)/277.5 (366).

The proportion of women was higher in the groups with sickness absence than in the group with no sickness absence, especially "distant high" and "stable high". Mean age was highest in the "stable high" group and lowest in the "no absence" group. The groups with sickness absence had lower levels of education, occupational class and income than the "no absence" group. There was on the other hand no association between employment type and history of sickness absence (table 2).

Table 2 Description of employees in a general working population sample with various histories of registered sickness absence (2001-2007)

	No absence† *n*=1535	Stable low† *n*=521	Distant high† *n*=198	Recent high† *n*=150	Stable high† *n*=177
Gender (%)**					
Women	48.6	62.2	71.2	64.0	71.8
Age (mean (SD))**	44.1(11.5)	45.8(10.7)	47.5(10.5)	46.9(11.1)	50.4(9.4)
Level of education (%)**					
Higher education	45.3	33.6	33.9	34.6	33.3
Upper secondary	41.6	42.6	42.9	46.0	35.6
Elementary or less	12.6	22.3	22.2	18.7	30.5
Missing	0.5	1.5	1.0	0.7	0.6
Occupational class (%)**					
Higher non-manual, Entrepren.	22.8	10.5	15.1	10.7	10.2
Intermediate - low non-manual	43.4	39.2	36.9	44.0	37.3
Skilled - unskilled manual	32.2	48.2	46.5	44.0	49.2
Missing	1.6	2.1	1.5	1.3	3.4
Income (%)**					
≥300 000 SEK	41.2	29.0	27.3	27.3	17.5
150 000-299 000 SEK	49.3	63.9	62.6	68.0	73.5
≤149 000 SEK	9.5	7.1	10.1	4.7	9.0
Form of employment (%)					
Permanent job	91.7	91.5	90.4	91.4	90.4
Temporary job	7.2	7.3	8.1	7.3	8.5
Missing	1.1	1.2	1.5	1.3	1.1

Bivariate associations examined using chi-square tests for categorical and Anova for continuous variables. Missing responses are handled using pairwise deletion.
†No absence: No registered sickness absence days (SA, i.e. beyond 14 days) during the follow-up period 2001-2007. Stable low: SA below the median split 2001-2007. Distant high: SA above the median split 2001-2003 and below the median split 2004-2007. Recent high: SA below the median split 2001-2003 and above the median split 2004-2007. Stable high: SA above the median split 2001-2007.
**p<.001

Current perceived low overall social support at work in relation to various patterns of previous sickness absence

Those having a "recent high", "stable high" and "stable low" sickness absence history had increased odds for reporting low overall level of perceived social support at work compared to those without a history of sickness absence. Effects were somewhat higher for the two former than for the latter group albeit with overlapping confidence intervals (crude OR=1.7, 95%CI 1.2-2.4; OR=1.5, 95%CI 1.1-2.1; and OR=1.3, 95%CI 1.0-1.6, respectively). Adjusting for

confounders hardly altered the effect sizes. There was no difference in social support between those in the "distant high" group and those with no sickness absence (table 3).

Table 3 Effect of previous sickness absence on current low perceived social support at work and low perceived immediate superior support. Logistic regression analyses, crude and adjusted models

Sickness absence history†		Low social support		Low superior support	
		OR	95% CI	OR	95% CI
Stable low	Crude	1.3	1.0-1.6	1.0	0.7-1.5
	Adjusted‡	1.3	1.0-1.5	1.0	0.7-1.4
Distant high	Crude	1.1	0.8-1.5	2.1	1.4-3.1
	Adjusted‡	1.1	0.8-1.5	2.1	1.4-3.2
Recent high	Crude	1.7	1.2-2.4	1.8	1.1-2.9
	Adjusted‡	1.7	1.2-2.4	1.8	1.1-2.9
Stable high	Crude	1.5	1.1-2.1	2.0	1.3-3.1
	Adjusted‡	1.5	1.1-2.1	2.1	1.3-3.3

Each sickness absence history group is contrasted to those with no registered sickness absence (reference group).
†No absence: No registered sickness absence days (SA, i.e. beyond 14 days) during the follow-up period 2001-2007. Stable low: SA below the median split 2001-2007. Distant high: SA above the median split 2001-2003 and below the median split 2004-2007. Recent high: SA below the median split 2001-2003 and above the median split 2004-2007. Stable high: SA above the median split 2001-2007.
‡Adjusted for age in analysis on social support index as outcome, and adjusted for age, education and work class in the analysis on low immediate superior support.
Missing responses handled using multiple imputations.

Current perceived low immediate superior support in relation to various patterns of sickness absence

Having a "distant high", "recent high" or "stable high" sickness absence history gave increased odds for reporting that their immediate superior rarely or never consider their views, compared to having no previous sickness absence (adjusted OR=2.1, 95%CI 1.4-3.2; OR=1.8,

95%CI 1.1-2.9; and OR=2.1, 95%CI 1.3-3.3, respectively). There was no difference between the "stable low" group and those with no history of sickness absence (table 3).

Aspects of current perceived social support at workplace in relation to various patterns of sickness absence

When analysing each single item of perceived social support separately, the "stable high" group followed by the "recent high" had the overall highest odds for experiencing low social support, albeit with overlapping confidence intervals compared to the effects of the other sickness absence groups. These two were also the only groups significantly associated with the items *"I do not get along well with my superiors"* and *"I do not get along well with my colleagues"* (table 4). The item with the overall highest effect size across sickness absence groups was *"My colleagues are not there for me"* (table 4), while the single association with the highest effect size was between the "stable high" group and the item "*There is not good collegiality at work"* (OR=2.9, 95%CI 1.9-4.5). The "distant" group showed non-significant associations to all items except the item *"There is not a calm and pleasant atmosphere at my workplace"* (table 4).

Table 4 Effect of previous sickness absence patterns (2001-2007) on single-items regarding current social support at work (2008). Logistic regression analysis, age adjusted

	There is not a calm and pleasant atmosphere at my workplace‡		There is not good collegiality at work‡		My colleagues are not there for me‡		People at work do not understand that I can have a bad day‡		I do not get along well with my superiors‡		I do not get along well with my colleagues‡	
Sickness absence history†	**OR**	**95%CI**	**OR**	**95%CI**	**OR**	**95%CI**	**OR**	**95%CI**	**OR**	**95%CI**	**OR**	**95%CI**
Stable low	1.2	1.0-1.6	1.7	1.3-2.3	2.3	1.6-3.2	1.4	1.1-1.9	1.2	0.8-1.7	1.5	0.9-2.4
Distant high	1.9	1.3-2.6	1.4	0.9-2.3	1.2	0.7-2.3	0.9	0.6-1.5	1.3	0.7-2.3	0.9	0.4-2.1
Recent high	1.6	1.0-2.3	1.5	0.9-2.6	2.7	1.6-4.6	1.2	0.7-2.0	1.8	1.0-3.2	2.3	1.2-4.4
Stable high	2.5	1.8-3.5	2.9	1.9-4.5	2.6	1.6-4.4	1.7	1.1-2.6	1.9	1.1-3.3	2.5	1.4-4.7

‡For all outcomes, the odds of responding "agree to some extent" or "agree" to the given items are calculated. Each sickness absence history group is contrasted to those with no registered sickness absence (reference group). Missing responses handled using multiple imputations.

†No absence: No registered sickness absence days (SA, i.e. beyond 14 days) during the follow-up period 2001-2007. Stable low: SA below the median split 2001-2007. Distant high: SA above the median split 2001-2003 and below the median split 2004-2007. Recent high: SA below the median split 2001-2003 and above the median split 2004-2007. Stable high: SA above the median split 2001-2007.

DISCUSSION

Main results

The main finding of this study was that previous sickness absence was associated with current low perceived social support at work. The highest odds for low social support were found among those who had a stable high level of sickness absence. Interestingly, our two indicators of perceived social support were somewhat differently associated with previous sickness absence; while recency of absence showed to be of importance for general support at work and relationship with colleagues and superiors, experiencing low immediate superior support was mainly related to having had a high level of sickness absence, irrespective of recency.

Strengths and limitations

One of the main strengths of this study was the linkage between a population-based health survey and registries of sickness absence up to seven years prior to the survey. The many and comparable data points on sickness absence enabled including both the time aspect as well as extent of previous sickness absence in our analyses. Only a handful of studies have examined the impact of having a history of sickness absence, even fewer have taken the time aspect into consideration. The use of register data on sickness absence minimized problems with attrition and response bias. Gathering data on exposure and outcome from different sources further decreased the risk of response bias. The social support scale is a commonly used instrument in Scandinavia and is found to have good psychometric properties.(31) Finally, the general population design allowed studying employees across different work settings, increasing generalizability of the results.

The following limitations also need to be considered. As with other population-based surveys, non-participation and selective participation remains a challenge, with lower participation-rates in the current study among men, younger individuals, those with lower incomes and those born outside the Nordic countries.

A key limitation is that social support only was measured at one time point, precluding adjustments for baseline status as well as investigating degree of stability in support at work. Low social support at baseline might have contributed to elevated sickness absence in the first place, as demonstrated in several studies.(13-15, 18) Nonetheless, our data on sickness absence goes back seven years from the time point measuring social support at work. If our results indicate that employees had problems regarding social support at work seven years back already, the results arguably pinpoint a central issue regarding sickness absence. The study may also be considered a first step to investigate the possible bidirectional or reciprocal causal relationship of the much more studied association between social support at work and sickness absence.(24) Further studies employing a multi-wave design are suggested to examine the quality of the association, like degree of reciprocity, in more detail.

Immediate superior support was measured employing a single item with unknown psychometric properties, and should be interpreted with caution. A factor analysis merging the item with the support scale supported a one-factor solution, however the item was in general less correlated with the other items than the correlations between the items in the established scale (data not shown). Further, the two measures aim at different theoretical constructs, the former regarding atmosphere(30) and the latter fairness/justice/participation at the workplace.(33) To not distort the quality of the scale, and to explore various aspect of social support, we chose to analyze the single item separately.

The measure of previous sickness absence was rather crude, including the total number of registered sickness absence days (beyond 14 days if employed) per year. One should hence be cautious generalizing our results to patterns of shorter spells, as analyses of more fine-tuned fluctuations in sickness absences might show different qualities and correlates. Being able to detect significant differences between the sickness absence groups using a crude measure increase our confidence in that a true association exists between previous sickness absence and social support at work.

From July 2003 till December 2004 the employer-covered period were extended from 14 till 21 days in Sweden,(34) yielding slightly different inclusion criteria for LISA registration during this period compared to the rest of the follow-up period. A sensitivity analysis, excluding data from 2003 and 2004, did however not change the overall findings (data not shown).

The relationship between sickness absence and social support might show different patterns between men and women, as found in some studies examining the opposite direction of this association.(13, 14, 18) Small sickness absence groups constrained the use of gender-stratified or interaction analyses. There were no differences in social support between men and women in the data, suggesting that gender differences do not explain the associations found. Gender differences can however not be ruled out, and considering the high sickness absence rate among women, further studies specifically investigating explanations for this gender gap are warranted.

Interpretation

This is the first study that we know of to examine the association between previous sickness absence and current perceived social support at the workplace in a longitudinal design. The results add to the small literature illustrating that a unidirectional approach to the relationship between psychosocial work conditions and measures of health, like sickness absence, is inadequate.(25, 26) The findings further harmonize with Sieurin's descriptive study,(9) which showed that many long-term absentees, especially those full-time absent, experienced that their absence negatively affected their sense of belonging to the workgroup. We did not differentiate between full-time and part-time absence in our study. Nonetheless, the odds for low perceived social support at work were generally higher for those with a high level of absence than for those with lower levels of absence. This difference may suggest that keeping some contact with the workplace during sickness absence is beneficial to maintain social inclusion at work, whilst acknowledging that the expedience of contact may vary e.g. with cause of absence.(35) Social support at work might also be seen as part of the push and pull factors that motivates an individual to be present or absent from work.(36) We can only speculate about the wider consequences of the potential negative impact of sickness absence on social support at work as suggested by our results. A conceivable consequence is that it contributes to negative processes that increase risk of lasting work exclusion by challenging return to work or contributing to further episodes of sickness absence.

While a high level of absence in the recent years was associated with current low perceived social support at work, a high level of absence some years ago was not. This may indicate a time aspect in the association. One explanation of this "time effect" is that the association between recent absence and social support reflects an effect of ongoing work conditions on sickness absence, as examined and found in previous studies.(e.g. 20) However, a

sensitivity analysis censoring those on sickness absence on time of participation only reduced the effect sizes to some extent, leaving this interpretation only partly supported by the data (data not shown). An alternative interpretation is that sickness absence actually affect social support at work, but only if the absence is relatively recent: First, sickness absence can add strain on co-workers, thereby draining their goodwill and this problem may increase with length of sickness absence, as described by co-workers themselves in a Swedish qualitative study.(37) Such interpretation further fits well with the results showing that the single-item with the overall highest effect-size across pattern of previous sickness absence was experiencing that the colleagues were not there for them. The finding illustrates that the relationship with colleagues may be highly relevant to take into account in return to work processes after long-term absences.(37) Second, the non-significant association between the "distant high" sickness absence group and current perceived social support could mean that these have sorted out their situation, especially regarding their colleagues, either through successful social reintegration or by changing work place or task. More studies are required to replicate our finding and to gain better understanding for how sickness absence can affect social inclusion at work.

Experiencing that the immediate superior rarely or never regarded one's view did on the other hand not depend on recency, but on whether one had a history with high level of sickness absence at all. This could partly be a result of a downward selection process, where those with a high level of absence drift towards less favorable jobs with lower opportunities for discretion.(38) Interestingly, the association between level of absence and immediate superior support was not explained by socio-demographic factors such as occupational class or income. Bearing in mind the possibility of residual confounding and the uncertainties regarding causality and the use of a single-item outcome, the finding could suggest that sickness absence have an independent effect

on job status or the experience of being treated with justice and fairness. The finding is worth further investigation, as there are promising results on the role of superior support in improving return to work: Though findings are not unequivocal across health conditions(23) and gender,(39) superior support is found to predict return to work in a systematic review on patients with low back pain(22) as well as in a controlled study on worker superior communication among long-term absentees due to burn out.(40)

Other factors than the sickness absence as such, like mental health factors and personality, might have contributed in the association between sickness absence and social support at work found in the current study. It could for instance be that workers with mental illnesses are at greater risk of low social support than workers with less stigmatized illnesses. Further, workers with depression and anxiety have described that that they tend to distort work tasks, which again may depreciate the relationship with colleagues.(41) The associations between social support and mental health, depression and personality are complex. Low perceived social support at work is found to be a risk factor for depression, but depression and negative affectivity may also affect a worker's perception of and interaction with their work environment.(42) Further, though results are inconclusive,(16) a partial reverse causation in the association between psychosocial working condition and mental wellbeing has been suggested.(25) The cross-sectional measurement of these variables restricted investigating these aspects in our study. Further studies, measuring each variable of interest at several time points, may clarify the mechanisms involved in more detail.

CONCLUSION

Results showed that both recency and extent of previous sickness absence were related to current perceived social support at work. The findings illustrate that sickness absence may have negative consequences for social inclusion at the workplace. Nevertheless, it does also point to the need of more research using individual repeated measurements, under which the impact of sickness absence for social inclusion and integration at work could be interesting to trace out in more detail.

Contributions

MK contributed in conception and design of the study, analyzed the data, interpreted the data, and drafted the manuscript and consequent revisions regarding important intellectual content. KH, GH and SØ contributed in conception and design of the study, interpretation of the data, and critical revisions of the manuscript for important intellectual content. All authors approved of the final version of the manuscript.

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Competing interest

None

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Data sharing

No additional data available.

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Previous sSickness absence ~~as a risk factor for~~and current low perceived social support at work among employees in the general population: a ~~retrospective~~ historical cohort study

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ABSTRACT

Objective

Though sickness absence often is a process over time, most studies have treated the phenomenon as a discrete event and focused on its causes more than the consequences. We aimed to examine whether various patterns of previous long-term sickness absence were associated with ~~predicted~~ current low perceived social support at work.

Method

This is a ~~retrospective~~ historical cohort study based on data from a population-based survey among Swedish employees (*n*=2,581~~646~~). The survey data was linked to official registries yielding data on sickness absence one to seven years prior to the survey.

Results

The main finding was that previous sickness absence was associated with current ~~predicted~~ low perceived social support at work. The highest odds for low social support were found among those who had a stable high level of sickness absence. ~~Our~~ The two indicators of perceived social support ~~studied~~ employed were somewhat differently ~~predicted by~~associated with previous sickness absence: Recency of absence showed to be of importance for general support at the workplace and the relationship with colleagues and superiors. Experiencing that the immediate superior rarely or never regards their view was on the other hand mainly related to having had a high level of sickness absence, irrespective of recency.

Conclusions

~~As the first study to address this issue, our~~Our results indicate that recency and ~~level~~ extent of previous sickness absence ~~may affect~~is related to perceived social support at work. Future research on the relationship between social support and sickness absence should use ~~The study also points to the~~

need of more research using individual repeated measurements and acknowledge the possible bidirectional relationship.

Strengths and limitations of this study:

- Previous research have demonstrated that social support at work predicts sickness absence, but This is the first study to explore how previous sickness absences are associated with predict current perceived social support at work.
- The participants were drawn from the general population, and included employees across different work settings.
- Information on previous sickness absence was based on seven years of registry information. This minimizes problems with attrition and response bias, allows examination of both timing and extent of previous sickness absence in relation to current social support.
- Social support was only measured at one time point, precluding adjustments for baseline status as well as investigating degree of stability in perceived social support at work. We recommend further studies with use of individual repeated measurements.
- As with other population based surveys, non participation and selective participation remains a challenge, with lower Participation-rates in the current studywere lower among men, younger individuals, those with lower incomes and those born outside the Nordic countries.

INTRODUCTION

In many cases, sickness absence is a process over time that may carry its own consequences for the individual.(1) Prolonged and repeated sickness absence is a precursor for future sickness absence, (2), unemployment, work termination(3) and disability pension,(4, 5) and the associations cannot be explained by deterioration in health only.(6) Sickness absence can mean deprivation of an important social arena, with social marginalisation, isolation and exclusion as possible results.(7-9) Two Swedish studies have found long-term sickness absentees to report far more negative consequences of their sickness absence than positive ones, such as negative effects on health, sleep, mental wellbeing,(8) salary, career possibilities and zest for work.(9) The vast majority of studies on sickness absence have however treated the phenomenon as a discrete event, and aimed to identify its causes more than the consequences.(1)

Social support affects health(10) and social support at work is one of the work characteristics extensively studied in relation to sickness absence. Albeit an employee's relationships with colleagues and superiors can be considered to be more formal than the relations to family and friends, the social network at work can be an important source of support for the employee, especially considering the hours spent at work and the importance of work in Western societies.(11, 12) Low support is found to be associated with later sickness absence in studies across several cohorts,(13-16) is observed in both public and private sector(17) and generally regarding support from co-workers as well as superiors.(18-20) Experiencing justice and fairness, for instance through experiencing being listened to by ones immediate superior, is another aspect of social support found associated with being on sickness absence.(21) Social support is also relevant for employees returning to work after being off sick.(22, 23)

There is an increased awareness on the possible reversed or reciprocal relationship between work conditions and health, i.e. that health through various mechanisms might influence work characteristics or that these factors affect each other bi-directionally.(24) A recent review study concluded that the relationship between job demand-control-support and job-related wellbeing might partly be reciprocal or reverse,(25) and a four-wave study found evidence for a reciprocal causal relationship between work characteristics, including social support and mental health.(26) Studies challenging a unidirectional relationship between social support and sickness absence are scarce. One Swedish study found that long-term absentees often reported that their absence affected their sense of belonging to the workgroup negatively, especially if full-time absent.(9) The cross-sectional design of that study however precludes making inferences about the temporal relationship between work absence and social inclusion at work.

In summary, few have examined patterns of sickness absence and their correlates. It is possible that sickness absence sets negative social processes in motion and that these difficulties add to the troubles causing the sickness absence in the first place and challenges returning to and retaining work. To increase understanding of these social processes, the overall aim of this study is to examine whether various patterns of previous long-term sickness absence are associated with ~~predicts~~ current low perceived social support at work in a longitudinal analysis. We will include two measures of social support at work and explore the relevance of sub-items of the social support scale employed.

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METHOD

Study design and participants

This is a ~~retrospective~~ historical cohort study linking data from the Health Assets Project (HAP) survey in 2008 to official registries of sickness absence one to seven years prior to the HAP survey. HAP was specifically designed to gain knowledge about the influence of individual, organizational and societal factors on health, sickness absence and return to work. The target population in HAP was individuals aged 19-64 in Västra Götaland in Western Sweden, a region with both urban and rural areas and a population of 1.6 million (17% of the Swedish population). More details about HAP are described elsewhere.(27) A random sample was extracted from Statistics Sweden April 2008 (n=7,984) and invited to participate. Data was collected using ~~registered~~ registry data and a postal questionnaire including items on socio-demographic factors, physical and mental health, issues concerning sickness absence, work and family conditions, life events, leisure and lifestyle. The participation rate was 50.4% (n=4,027). A dropout analysis showed a significant higher dropout rate in the youngest age group (19-30 years of age), those with the lowest income level (≤ 149,000 SEK), as well as amongst those born outside the Nordic countries. In the present study, we excluded those younger than 23 years of age in 2008 (n=277), those reporting not being employed when participating in the survey (n=1090), ~~and~~ those registered with sickness compensation in 2008 who did not answer any of the items regarding social support (n=14), and those with missing data on sickness absence one or more of the follow-up years 2001-2007 (n=65). The final study sample was n=2,581~~646~~.

Measures

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Predictor: Sickness absence history 2001-2007

Using personal identification numbers, survey data were linked to the "Longitudinal integrated database for sickness insurance and labour market research", Statistics Sweden (LISA) records on sickness absence. In the Swedish insurance system, the employer covers sickness benefit the first 14 days of a sickness absence spell (except one qualifying day), thereafter benefits are granted from the Social Insurance Agency and registered in LISA. For self-employed and those without employment (e.g. unemployed and students), the sickness benefit is paid and registered from day two. LISA comprises information on an individual's total number of registered sickness absence days per year. Some participants (n=86) were granted sickness compensation or activity compensation one or more of the years after this benefit arrangement was established in 2003. As these benefits are awarded for severe and lasting work disability, we coded the number of absence days as full time sickness absence (365 days) for the calendar year a person received a sickness or activity compensation benefit. We excluded those with m~~M~~issing data on sickness absence on one or more of the follow-up years (n=65), since many of these probably were out of risk for sickness absence due to migration. These cases were nonetheless at risk at least some of the follow-up years, and some missing could be caused by registration error and regarded random. To check robustness of our results, we run a sensitivity analysis where we included the cases and treated missing through multiple imputations. Results were similar across solutions (data not shown). ~~for instance due to immigration or individuals out of work life studying, was handled by multiple imputation.~~

Based on th~~e~~is information from the LISA-register, we constructed groups with different patterns of previous sickness absence to relate them to current perceived social support. Initially, we performed exploratory latent class analyses (LCA), a statistical

technique suitable for finding meaningful subgroups in a population that are similar e.g. in their growth trajectories (28) Due to difficulties in including the subgroup with sickness compensation in the LCA and low power due to small categories if excluding this subgroup, we chose to rather construct groups based on median splits, informed by the observations of the LCA; Firstly, as suggested from the LCA, we ~~The groups were constructed from observations in an initial exploratory latent class analysis, and further informed by the goal of creating meaningful categories, and to retain reasonable group sizes for statistical power. We therefore~~ split the follow-up period from 2001 to 2007 into a "distant" (2001-2004) and "recent" (2005-2007) period. ~~For each period,~~Then we calculated the participant's total number of registered sickness absence days ~~was calculated~~for each period. Again for each of the periods, the participants' absence was~~ere~~ coded as low ("0") or high ("1") by a median split on the total sickness absence days. This allowed us to construct the following five mutually exclusive categories (see table 1 for overview of categorization criteria): 1) "no absence"; no registered sickness absence during the whole period, 2) "stable low"; a total number of sickness absence days below the median in both of the periods, 3) "distant high"; above median in the "distant" period, and below the median in the recent; 4) "recent high"; below the median the "distant" period, and above the median in the "recent", and finally, 5) "stable high"; above the median on number of sickness absence days in both the "distant" and the "recent" period. The results employing the described grouping yielded similar results as with the more fine-tuned groupings complied through LCA (data not shown). The sickness absence patterns were in addition similar to those emerged from a previous published trajectory analysis (29).

Table 1. Categories of previous registered sickness absence 2001-2007.

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Category	Sickness absence during 2001-2003	Sickness absence during 2004-2007
Reference	No sickness absence	No sickness absence
Stable low	Sickness absence **below** median split	Sickness absence **below** median split
Distant high	Sickness absence **above** median split	Sickness absence **below** median split
Recent high	Sickness absence **below** median split	Sickness absence **above** median split
Stable high	Sickness absence **above** median split	Sickness absence **above** median split

Outcome: Social support at work 2008

Two measures of perceived social support were employed; a workplace social support indicator and a question on immediate superior support.

First, a workplace social support indicator was constructed from the support subscale in the Swedish Demand-Control-Support Questionnaire (DCSQ).(30) The scale is based on Johnson and Halls' model(11) and focus on the atmosphere at work. The participants were asked to what extent they agreed (agree; agree to some extent; disagree to some extent; disagree) to the following six statements: "*There is a calm and pleasant atmosphere at my workplace"; "There is good collegiality at work"; "My colleagues are there for me"; People at work understand that I can have a bad day"; I get along well with my superiors"; "I get along well with my colleagues".* Answers were coded 1-4 and summarized, giving a scale from 6-24 were a higher score denoted higher social support (Cronbach's α=0.86). The scale is found to have satisfactory psychometric properties.(31) A principal component analysis supported a one-factor solution in our data. Due to non-normal distribution and in order to identify high versus low level of social support, the total score was split by the median. A

sensitivity analysis was performed, treating the scale continuously in log-transformed regression analyses, which gave similar results. In addition, sub –analyses were performed keeping each of the single-items as separate outcomes to explore which aspects of support were most relevant in relation to sickness absence history (dichotomized, low support operationalized as responding disagree to some extent or disagree).

Second, we included a single-item measure on immediate superior support; *"Does your immediate superior consider your views?"* (Yes, frequently; yes, sometimes; no, rarely; no, never/almost never; no, I don't have a manager). Answers were dichotomized, giving a high (yes, frequently; yes, sometimes) and a low (no, rarely; no, never/almost never) support group. Participants responding that they did not have a superior were excluded from the analyses regarding this outcome (*n*=6).

Demographic variables.

The following demographic factors were extracted from Statistics Sweden: Gender (male, female), age (~~23–34, 35–44, 45– 54, 55–64 years~~mean), gross income (SEK ≤149 000, 150 000–299 000, ≥300 000) and occupational class (unskilled–skilled manual, low–intermediate non-manual, higher non-manual and entrepreneurs). Level of education (elementary or less, upper secondary and higher) and type of employment (temporary, permanent) was self-reported.

Analyses

We employed MPlus to perform the initial exploratory LCA analyses. The remaining~~All~~ analyses were performed in Stata 12. Initially, differences in background characteristics

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(gender, age group, income level, occupational class, education level and type of employment) between employees with different sickness absence histories were examined using chi-square tests and Anova. Further, median (IQR) days per year of previous sickness absence were calculated. In the latter calculations individuals on sickness and activity compensation during follow-up were excluded, as we did not have their exact number of absence days registered. Then we examined whether each of the two social support outcomes could be predicted by previous sickness absence, building multivariate logistic regression models. For both models, we first tested for crude associations, before including candidate confounders (gender, age, income, occupational class, education, type of employment). Only variables found related to both exposure and outcome in the data ($p<.05$) were included as confounders in the model (age in social support scale; age, education and occupational class for immediate superior support outcome). Finally, to explore the relevance of different aspects of social support, we performed sub-analyses where we treated each of the sub-items of the social support scale as separate outcomes.

We employed multiple imputations to handle missing data using the multivariate normal model procedure in Stata 12, with 20 cycles of imputation. All variables reported in the study in addition to variables on health and wellbeing were included as auxiliary variables to perform the imputation, where missing responses were substituted by predictions based on valid responses from all other variables (see table 2 for magnitude of internal missing per variable). The variables were subsequently rounded to the original scale to enable multi-nominal regression analyses, and Allison's(32) recommended procedure was followed for nominal variables with more than two categories.

Ethics approval

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The HAP study was approved by the Ethics Committee, University of Gothenburg, Sweden, registration number 039-08.

RESULTS

Characteristics of employees with ~~different~~ various sickness absence histories

The total sample was *n*=2581~~646~~, whereof 55.2% were women and mean (SD) age was 45.1 (11.2). Of these, 1535 (59.5%) had no registered sickness absence in during the seven years follow-up period prior to the survey~~the follow-up periods~~. Of those 1046 who had at least one episode of registered sickness absence in this period ~~during the seven years period prior to the survey~~, 521 (20.2%) were categorized as having a "stable low" absence pattern, 198 (7.7%) as "distant high", 150 (5.8%) as "recent high", and finally 177 (6.9%) were categorised as "stable high" (see operationalization in method section). Median (IQR) sickness absence days per year in the first (2001-2004) and second (2005-2007) follow-up periods were as follows in the groups: "Stable low": first period 6(19)/second period 1(16); "distant high": 127(197)/0(9); "recent high": 0(7)/177 (259); "stable high" 212.5 (299)/277.5 (366).

The proportion of women was higher in the groups with sickness absence than in the group with no sickness absence, especially "distant high" and "stable high". Mean age was highest in the "stable high" group and lowest in the "no absence" group. The groups with sickness absence had lower levels of education, occupational class and income than the "no absence" group. There was on the other hand no association between employment type and history of sickness absence (table 2~~1~~).

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Table 2 ~~1~~ Description of employees in a general working population sample with ~~different~~ various histories of registered sickness absence (2001-2007)

	No absence† ***n*=1535**	**Stable low†** ***n*=521**	**Distant high†** ***n*=198**	**Recent high†** ***n*=150**	**Stable high†** ***n*=177**
Gender (%)**					
Women	48.6	62.2	71.2	64.0	71.8
Age (mean (SD))**	44.1(11.54)	45.8(10.7)	47.5(10.5)	46.9(11.1)	50.4(90.4)
Level of education (%)**					
Higher education	45.3	33.6	33.98	34.67	33.3
Upper secondary	41.6	42.6	42.9	46.0	35.6
Elementary or less	12.6	22.3	22.2	18.7	30.5
Missing	0.5	1.5	1.0	0.7	0.6
Occupational class (%)**					
Higher non-manual, Entrepren.	22.8	10.56	15.12	10.7	10.2
Intermediate - low non-manual	43.45	39.2	36.9	44.0	37.3
Skilled - unskilled manual	32.2	48.2	46.5	44.0	49.2
Missing	1.6	2.1	1.5	1.3	3.4
Income (%)**					
≥300 000 SEK	41.2	29.0	27.3	27.3	17.5
150 000-2990 000 SEK	49.3	63.9	62.6	68.0	73.54
≤149 000 SEK	9.5	7.1	10.1	4.7	9.0
Form of employment (%)					
Permanent job	91.7	91.56	90.4	91.43	90.4
Temporary job	7.2	7.3	8.1	7.3	8.5
Missing	1.1	1.2	1.5	1.3	1.1

Bivariate associations examined using chi-square tests for categorical and Anova for continuous variables. Missing responses are handled using pairwise deletion.

†No absence: No registered sickness absence days (SA, i.e. beyond 14 days) during the follow-up period 2001-2007.
Stable low: SA below the median split 2001-2007.
Distant high: SA above the median split 2001-2003 and below the median split 2004-2007.
Recent high: SA below the median split 2001-2003 and above the median split 2004-2007.
Stable high: SA above the median split 2001-2007.
**p<.001

Current low perceived overall social support at work ~~predicted by different~~ in relation to various patterns of previous sickness absence ~~histories~~

Those having a "recent high", "stable high" and "stable low" sickness absence history had increased odds for reporting low overall level of perceived social support at work compared to those without a history of sickness absence. Effects were somewhat higher for the two former than for the latter group albeit with overlapping confidence intervals (crude OR=1.7, 95%CI

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1.2-2.4; OR=1.5, 95%CI 1.1-2.1; and OR=1.3, 95%CI 1.0-1.6~~5~~, respectively). Adjusting for confounders hardly altered the effect sizes. There was no difference in social support between those in the "distant high" group and those with no sickness absence (table 3~~2~~).

Table 3~~2~~ Effect of previous sickness absence on current low perceived social support at work and low perceived immediate superior support. Logistic regression analyses, crude and adjusted models

Sickness absence history†		Low social support		Low superior support	
		OR	95% CI	OR	95% CI
Stable low	Crude	1.3	1.0-1.6~~5~~	1.0	0.7-1.5~~4~~
	Adjusted‡	1.3	1.0-1.5	1.0~~0.9~~	0.7-1.4~~3~~
Distant high	Crude	1.1	0.8~~9~~-1.5~~6~~	2.1	1.4-3.1
	Adjusted‡	1.1	0.8-1.5	2.1~~0~~	1.4~~3~~-3.2~~1~~
Recent high	Crude	1.7	1.2-2.4	1.8	1.1-2.9
	Adjusted‡	1.7	1.2-2.4	1.8	1.1-2.9
Stable high	Crude	1.5	1.1-2.1	2.0	1.3-3.1
	Adjusted‡	1.5	1.1-2.1	2.1	1.3-3.3

Each sickness absence history group is contrasted to those with no registered sickness absence (reference group).
†No absence: No registered sickness absence days (SA, i.e. beyond 14 days) during the follow-up period 2001-2007.
Stable low: SA below the median split 2001-2007.
Distant high: SA above the median split 2001-2003 and below the median split 2004-2007.
Recent high: SA below the median split 2001-2003 and above the median split 2004-2007.
Stable high: SA above the median split 2001-2007.
‡Adjusted for age in analysis on social support index as outcome, and adjusted for age, education and work class in the analysis on low immediate superior support.
Missing responses handled using multiple imputations.

Current low perceived ~~low~~ immediate superior support ~~predicted~~ in relation to ~~by different~~various patterns of previous sickness absence ~~histories~~

Having a "distant high", "recent high" or "stable high" sickness absence history gave increased odds for reporting that their immediate superior rarely or never consider their views,

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compared to having no previous sickness absence (adjusted OR=2.10, 95%CI 1.43-3.20; OR=1.82.0, 95%CI 1.13-2.93.2; and OR=2.11.8, 95%CI 1.32-3.32.8, respectively). There was no difference between the "stable low" group and those with no history of sickness absence (table 32).

Aspects of current perceived current social support at workplace predicted by differentin relation to various patterns of sickness absence histories

When analysing each single item of perceived social support separately, the "stable high" group followed by the "recent high" had the overall highest odds for experiencing low social support, albeit with overlapping confidence intervals compared to the effects of the other sickness absence groups. These two were also the only groups significantly predicting the items *"I do not get along well with my superiors"* and *"I do not get along well with my colleagues"* (table 43). The item with the overall highest effect size across sickness absence groups was *"My colleagues are not there for me"* (table 43), while the single association with the highest effect size was between the "stable high" group and the item "*There is not good collegiality at work"* (OR=2.93.1, 95%CI 1.92.0-4.57). The "distant" group showed non-significant associations to all items except the item *"There is not a calm and pleasant atmosphere at my workplace"* (table 43).

Table 43 Effect of previous sickness absence patterns (2001-2007) on single-items regardingon current social support at work (2008). Logistic regression analysis, age adjusted

	There is not a calm and pleasant atmosphere at my workplace‡		There is not good collegiality at work‡		My colleagues are not there for me‡		People at work do not understand that I can have a bad day‡		I do not get along well with my superiors‡		I do not get along well with my colleagues‡	
Sickness absence history	**OR**	**95%CI**	**OR**	**95%CI**	**OR**	**95%CI**	**OR**	**95%CI**	**OR**	**95%CI**	**OR**	**95%CI**
Stable low	1.2	1.0-1.6	1.76	1.32-2.32	2.32	1.6-3.2	1.4	1.10-1.98	1.21	0.8-1.7	1.5	0.9-2.43
Distant high	1.98	1.3-2.6	1.4	0.98-2.32	1.23	0.7-2.3	0.910	0.6-1.56	1.32	0.7-2.32	0.9	0.4-2.1
Recent high	1.6	1.01-2.34	1.56	0.9-2.67	2.7	1.6-4.6	1.2	0.7-2.01	1.89	1.01-3.23	2.34	1.2-4.45
Stable high	2.5	1.8-3.56	3.12.9	1.92.0-4.57	2.6	1.6-4.43	1.7	1.1-2.6	1.9	1.1-3.3	2.5	1.4-4.75

‡For all outcomes, the odds of responding "agree to some extent" or "agree" to the given items are calculated. Each sickness absence history group is contrasted to those with no registered sickness absence (reference group). Missing responses handled using multiple imputations.

†No absence: No registered sickness absence days (SA, i.e. beyond 14 days) during the follow-up period 2001-2007.
Stable low: SA below the median split 2001-2007.
Distant high: SA above the median split 2001-2003 and below the median split 2004-2007.
Recent high: SA below the median split 2001-2003 and above the median split 2004-2007.
Stable high: SA above the median split 2001-2007.

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DISCUSSION

Main results

The main finding of this study was that previous sickness absence was associated with current ~~predicted~~ low perceived social support at work. The highest odds for low social support were found among those who had a stable high level of sickness absence. Interestingly, our two indicators of perceived social support were somewhat differently associated with ~~predicted by~~ previous sickness absence; while recency of absence showed to be of importance for general support at work and relationship with colleagues and superiors, experiencing low immediate superior support was mainly related to having had a high level of sickness absence, irrespective of recency.

Strengths and limitations

One of the main strengths of this study was the linkage between a population-based health survey and registries of sickness absence up to seven years prior to the survey. The many and comparable data points on sickness absence enabled including both the time aspect as well as ~~amount~~ extent of previous sickness absence in our analyses. Only a handful of studies have examined the impact of having a history of sickness absence, even fewer have taken the time aspect into consideration. The use of register data on sickness absence minimize~~d~~s problems with attrition and response bias. Gathering data on exposure and outcome from different sources further decreased the risk of response bias. The social support scale is a commonly used instrument in Scandinavia and is found to have good psychometric properties.(31) Finally, the

general population design allowed studying employees across different work settings, increasing generalizability of the results.

The following limitations also need to be considered. As with other population-based surveys, non-participation and selective participation remains a challenge, with lower participation-rates in the current study among men, younger individuals, those with lower incomes and those born outside the Nordic countries.

A key limitation is that social support only was measured at one time point, precluding adjustments for baseline status as well as investigating degree of stability in support at work. Low social support at baseline might have contributed to elevated sickness absence in the first place, as demonstrated in several studies.(13-15, 18) Nonetheless, our data on sickness absence goes back seven years from the time point measuring social support at work. If our results indicate that employees had problems regarding social support at work seven years back already, the results arguably pinpoint a central issue regarding sickness absence. The study may also be considered a first step to investigate the possible bidirectional or reciprocal causal relationship of the much more studied association between social support at work and sickness absence.(24) Further studies employing a multi-wave design are suggested to examine the quality of the association, like degree of reciprocity, in more detail.

Immediate superior support was measured employing a single item with unknown psychometric properties, and should be interpreted with caution. A factor analysis merging the item with the support scale supported a one-factor solution, however the item was in general less correlated with the other items than the correlations between the items in the established scale (data not shown). Further, the two measures aim at different theoretical constructs, the former

regarding atmosphere(30) and the latter fairness/justice/participation at the workplace.(33) To not distort the quality of the scale, and to explore various aspect of social support, we chose to analyze the single item separately.

The measure of previous sickness absence was rather crude, including the total number of registered sickness absence days (beyond 14 days if employed) per year. One should hence be cautious generalizing our results to patterns of shorter spells, as analyses of more fine-tuned fluctuations in sickness absences might show different qualities and correlates. Being able to detect significant differences between the sickness absence groups using a crude measure increase our confidence in that a true association exists between previous sickness absence and social support at work.

From July 2003 till December 2004 the employer-covered period were extended from 14 till 21 days in Sweden,(34) yielding slightly different inclusion criteria for LISA registration during this period compared to the rest of the follow-up period. A sensitivity analysis, excluding data from 2003 and 2004, did however not change the overall findings (data not shown).

The relationship between sickness absence and social support might show different patterns between men and women, as found in some studies examining the opposite direction of this association.(13, 14, 18) Small sickness absence groups constrained the use of gender-stratified or interaction analyses. There were no differences in social support between men and women in the data, suggesting that gender differences do not explain the associations found. Gender differences can however not be ruled out, and considering the high sickness absence rate among women, further studies specifically investigating explanations for this gender gap are warranted.

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Interpretation

This is the first study that we know of to examine the association between previous sickness absence and current perceived social support at the workplace in a longitudinal design. The results add to the small literature illustrating that a unidirectional approach to the relationship between psychosocial work conditions and measures of health, like sickness absence, is inadequate.(25, 26) The findings further harmonize with Sieurin's descriptive study,(9) which showed that many long-term absentees, especially those full-time absent, experienced that their absence negatively affected their sense of belonging to the workgroup. We did not differentiate between full-time and part-time absence in our study. Nonetheless, the odds for low perceived social support at work were generally higher for those with a high level of absence than for those with lower levels of absence. This difference may suggest that keeping some contact with the workplace during sickness absence is beneficial to maintain social inclusion at work, whilst acknowledging that the expedience of contact may vary e.g. with cause of absence.(35) Social support at work might also be seen as part of the push and pull factors that motivates an individual to be present or absent from work.(36) We can only speculate about the wider consequences of the potentia negative impact of sickness absence on social support at work as suggested by our results. A conceivable consequence is that it contributes to negative processes that increase risk of lasting work exclusion by challenging return to work or contributing to further episodes of sickness absence.

While a high level of absence in the recent years was associated with ~~predicted~~ current low perceived social support at work, a high level of absence some years ago ~~did~~ was not. This may indicate a time aspect in the association. One explanation of this "time effect" is that the

association between recent absence and social support reflects an effect of ongoing work conditions on sickness absence, as examined and found in previous studies.(e.g.-20) However, a sensitivity analysis censoring those on sickness absence on time of participation only reduced the effect sizes to some extent, leaving this interpretation only partly supported by the data (data not shown). An alternative interpretation is that sickness absence actually affect social support at work, but only if the absence is relatively recent: First, sickness absence can add strain on co-workers, thereby draining their goodwill and this problem may increase with length of sickness absence, as described by co-workers themselves in a Swedish qualitative study.(37) Such interpretation further fits well with the results showing that the single-item with the overall highest effect-size across pattern of previous sickness absence was experiencing that the colleagues were not there for them. The finding illustrates that the relationship with colleagues may be highly relevant to take into account in return to work processes after long-term absences.(37) Second, the non-significant association between the "distant high" sickness absence group and current perceived social support could mean that these have sorted out their situation, especially regarding their colleagues, either through successful social reintegration or by changing work place or task. More studies are required to replicate our finding and to gain better understanding for how sickness absence can affect social inclusion at work.

Experiencing that the immediate superior rarely or never regarded one's view did on the other hand not depend on recency, but on whether one had a history with high level of sickness absence at all. This could partly be a result of a downward selection process, where those with a high level of absence drift towards less favorable jobs with lower opportunities for discretion.(38) Interestingly, the association between level of absence and immediate superior support was not explained by socio-demographic factors such as occupational class or income. Bearing in mind

the possibility of residual confounding and the uncertainties regarding causality and the use of a single--item outcome, the finding could suggest that sickness absence have an independent effect on job status or the experience of being treated with justice and fairness. The finding is worth further investigation, as there are promising results on the role of superior support in improving return to work: Though findings are not unequivocal across health conditions(23) and gender,(39) superior support is found to predict return to work in a systematic review on patients with low back pain(22) as well as in a controlled study on worker superior communication among long-term absentees due to burn out.(40)

Other factors than the sickness absence as such, like mental health factors and personality, might have contributed in the association between sickness absence and social support at work found in the current study. It could for instance be that workers with mental illnesses are at greater risk of low social support than workers with less stigmatized illnesses. Further, workers with depression and anxiety have described that that they tend to distort work tasks, which again may depreciate the relationship with colleagues.(41) The associations between social support and mental health, depression and personality are complex. Low perceived social support at work is found to be a risk factor for depression, but depression and negative affectivity may also affect a worker's perception of and interaction with their work environment.(42) Further, though results are inconclusive,(16) a partial reverse causation in the association between psychosocial working condition and mental wellbeing has been suggested.(25) The cross-sectional measurement of these variables restricted investigating these aspects in our study. Further studies, measuring each variable of interest at several time points, may clarify the mechanisms involved in more detail.

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CONCLUSION

Results showed that both recency and ~~level~~ extent of previous sickness absence were related to current perceived social support at work. The findings illustrate that sickness absence may have negative consequences for social inclusion at the workplace. Nevertheless, it does also point to the need of more research using individual repeated measurements, under which the impact of sickness absence for social inclusion and integration at work could be interesting to trace out in more detail.

Contributions

MK contributed in conception and design of the study, analyzed the data, interpreted of the data, and drafted the manuscript and the consequent revisions regarding important intellectual content. KH, GH and SØ contributed in conception and design of the study, interpretation of the data, and critical revisions of the manuscript for important intellectual content. All authors approved of the final version of the manuscript.

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Competing interest

None

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~~**Ethics approval**~~

~~Ethics Committee, University of Gothenburg, Sweden.~~ **Data sharing**

No additional data available.

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STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Completed
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	OK
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	OK
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	OK
Objectives	3	State specific objectives, including any prespecified hypotheses	OK
Methods			
Study design	4	Present key elements of study design early in the paper	OK
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	OK, most details given, in addition to a reference to a previous published article giving further details
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	OK
		(*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	Not applicable
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	OK
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	OK
Bias	9	Describe any efforts to address potential sources of bias	OK
Study size	10	Explain how the study size was arrived at	OK
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	OK
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for	OK

confounding	
(*b*) Describe any methods used to examine subgroups and interactions	OK
(*c*) Explain how missing data were addressed	OK
(*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	OK
(*e*) Describe any sensitivity analyses	OK

Continued on next page

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	OK
		(b) Give reasons for non-participation at each stage	OK
		(c) Consider use of a flow diagram	OK
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	OK
		(b) Indicate number of participants with missing data for each variable of interest	OK
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	OK
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	NA
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	NA
		Cross-sectional study—Report numbers of outcome events or summary measures	NA
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	OK
		(*b*) Report category boundaries when continuous variables were categorized	OK
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	OK
Discussion			
Key results	18	Summarise key results with reference to study objectives	OK
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	OK
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	OK
Generalisability	21	Discuss the generalisability (external validity) of the study results	OK
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	OK

*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.