

THE INFLUENCE OF SICK LEAVE FREQUENCY DETERMINANTS ON HOMOGENEOUS GROUPS IN TWO SOCIO-ECONOMICALLY COMPARABLE, BUT SOCIO-CULTURALLY DIFFERENT REGIONS IN THE NETHERLANDS

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SUMMARY

Objectives: The aim of this study was to explore the influence of sick leave frequency determinants on in terms of age and profession homogeneous groups in two socio-economically comparable, but socio-culturally different regions in the Netherlands, i.e. Utrecht (mean frequency 1.10 spells) and South Limburg (mean frequency 1.92 spells). In addition, to get an idea of the study's topical interest, a literature review on sick leave frequency determinants covering the past few decades was performed.

Material and methods: 184 participants in the Utrecht and South Limburg regions were interviewed on work, individual and health characteristics. Sick leave frequency data were obtained from a social fund. For the literature review (inter)national scientific journals, academic theses and Medline were consulted.

Results: A comparison of sick leave frequency in the two regions showed that, in South Limburg, the determinants called 'opinion on social-medical support during sick leave', 'type of appointment' and 'annual number of visits (family doctor)' were associated with sick leave frequency whereas this was not the case in Utrecht. The literature review presented a highly consistent picture of determinants of sick leave frequency over the last few decades.

Conclusions: In the two regions studied, different determinants appeared to be associated with sick leave frequency. This phenomenon is attributed to the different socio-cultural characters of the regions. As per region different determinants appeared to be associated with sick leave frequency, nationwide interventions to reduce sick leave frequency should take into account the potential influence of regional differences in determinants that predict sick leave frequency. Sick leave frequency determinants have not changed in the past few decades. Although the study was performed in the nineties, its results are still relevant.

Key words: regions, homogeneous groups, sick leave frequency, determinants, the Netherlands

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INTRODUCTION

In the Netherlands indications for regional differences in sick leave frequency exist, whereas regional registration and research on determinants that could play a role in these differences is scarce. The same applies to research on determinants that could play a role in regional differences in sick leave duration, be it that recently an explorative study showed that in different regions different determinants predict sick leave duration (1).

In a Finnish study on sick leave frequency, performed in three demographic comparable municipalities, it appeared that the sickness absence practice is expression of the sickness absence habitus, which is deeply rooted in the social history of a locality as well as in the health-related behaviour of the residents (2, 3). In the Netherlands the mean frequency of sick leave showed differences between the provinces Overijssel and Gelderland (1.72 spells) and Utrecht, North- and South-Holland (2.00 spells) (4). These differences were attributed to the economic structure of

a region, characteristics of the population, health services and cultural differences (5).

Regional differences in health were found between the Dutch province of Limburg and the rest of the country (6, 7), but illness is not a good predictor of sick leave (8–10) whereas *personal well-being* (11–15) and *individual factors* are (9, 13, 16–22), as *atmosphere at the workplace* is (9, 16, 23–32).

Regarding *personal well-being*, *individual factors* and *atmosphere at the workplace* as important factors we assume that regional, i.e. socio-cultural characteristics, might influence the type of sick leave frequency determinants effective per region.

As for regions that show comparable demographic characteristics, are socio-economically comparable and have similar health services, in age and profession homogeneous study populations are expected to show comparable determinants that affect sick leave frequency. If not, region-related socio-cultural factors may play a role. Fig. 1 shows the theoretical model:

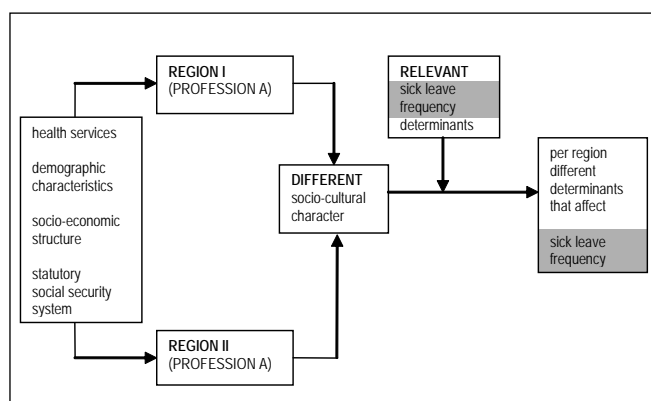


Fig. 1. Theoretical model*.

* Figure belonging to: Willibrord Beemsterboer et al. (2008): *The influence of sick leave frequency determinants on homogeneous groups in two socio-economically comparable, but socio-culturally different regions in the Netherlands.*

In regions with comparable health services, comparable demographic characteristics of residents, a comparable socio-economic structure and a similar statutory social security system, employees with a same profession live in an environment of different socio-cultural character.

We could not find any studies which compared the relation between similar sets of relevant sick leave frequency determinants and sick leave frequency in different regions. Therefore, the research question was: *Are there any differences in the determinants of sick leave frequency between homogeneous groups in different regions within the same country?*

The question was divided into four subquestions: 1. *How does sick leave frequency compare between homogeneous groups in different regions?* 2. *How do scores of individual sick leave frequency determinants compare between homogeneous groups in different regions?* 3. *How does sick leave frequency relate to relevant determinants between homogeneous groups in different regions?* 4. *Are there any differences in determinants that predict sick leave frequency between homogeneous groups in different regions?* 5. *Are the determinants in which regions differ correlated?*

To answer these questions a literature review was needed to identify the determinants of sick leave frequency found until the early nineties. The aim was to define a set of relevant determinants. In order to estimate the topicality of the study it was also considered useful to review the literature from the early nineties onwards.

The review resulted in the findings as showed in Fig. 2 (*Results of literature review 1984–2004*).

For the direction of the effect of determinants see Table 1 ('meaning of score').

After reviewing the literature we concluded that, during the last decades, a broad spectrum of determinants of sick leave frequency was mentioned in a highly consistent pattern. This conclusion was based on the finding that studies on sick leave frequency during the years 1984–2004 apparently focussed on similar determinants.

The literature search was performed in order to identify a set of relevant determinants. Identifying these determinants was merely a means to achieve the main purpose of the present study, i.e. to find any differences in effective sick leave frequency

determinants between regions based on their socio-cultural differences. Thus our study, focussed primarily on socio-cultural differences as a cause of regional differences in active sick leave frequency determinants, was not a study on sick leave frequency determinants as such.

MATERIAL AND METHODS

The aim was to study the relation between relevant determinants of sick leave frequency and the actual frequency of sick leave in terms of age and profession in homogeneous population groups in different regions of the country. Earlier an explorative study was performed on regional differences in duration of sick leave (1). In the present study, first it was established which determinants of sick leave frequency were relevant according to the literature of the last few decades. The literature review refers to a number of Dutch studies on determinants of frequency of sick leave until 1993 (11, 16, 17, 37, 40, 84).

For the period after 1993 (inter)national scientific journals, academic theses and Medline were consulted.

Registration of Data of Sick Leave

Since one of the authors worked for a Dutch social fund which registered the sick leave frequency *per region* – although for specific professional groups only (sale, cleaning, trade) – it was possible to compare the relations between relevant sick leave frequency determinants and the sick leave frequency registered per region.

REGIONS AND PROFESSION STUDIED

It was found that the professions sale and cleaning showed remarkable differences in sick leave frequency in different regions. For this reason and because a difference in socio-cultural climate was likely to be found, it was decided to investigate two regions: Utrecht (city of Utrecht and surroundings) and South Limburg (including the cities of Heerlen and Maastricht). As for the assumption that both regions were socio-culturally different, several indicators supported this as for instance the different socio-cultural history of Southern Limburg (i.e. a region hemmed in by Belgium and Germany), a less sober lifestyle of the residents (85), a poorer perception of health of the South Limburg population (86) and the higher disability rates found in South Limburg (86, 87) made it plausible that the regional character of this region was socio-culturally different from the rest of the country.

Earlier it was found that the profession *sale* showed remarkable differences in sick leave *duration* in specific regions (1). It appeared that the same applied to this profession but for sick leave *frequency*. Therefore, in the present study, we focussed on workers in *sale* which were compared as to their sick leave *frequency*. The ratio of this approach was to investigate the same phenomenon as we did earlier, be it now for another measure of sick leave. As a consequence per region remarkable similarities in determinants that affect sick leave may indicate the influence of socio-cultural characteristics of the study populations concerned.

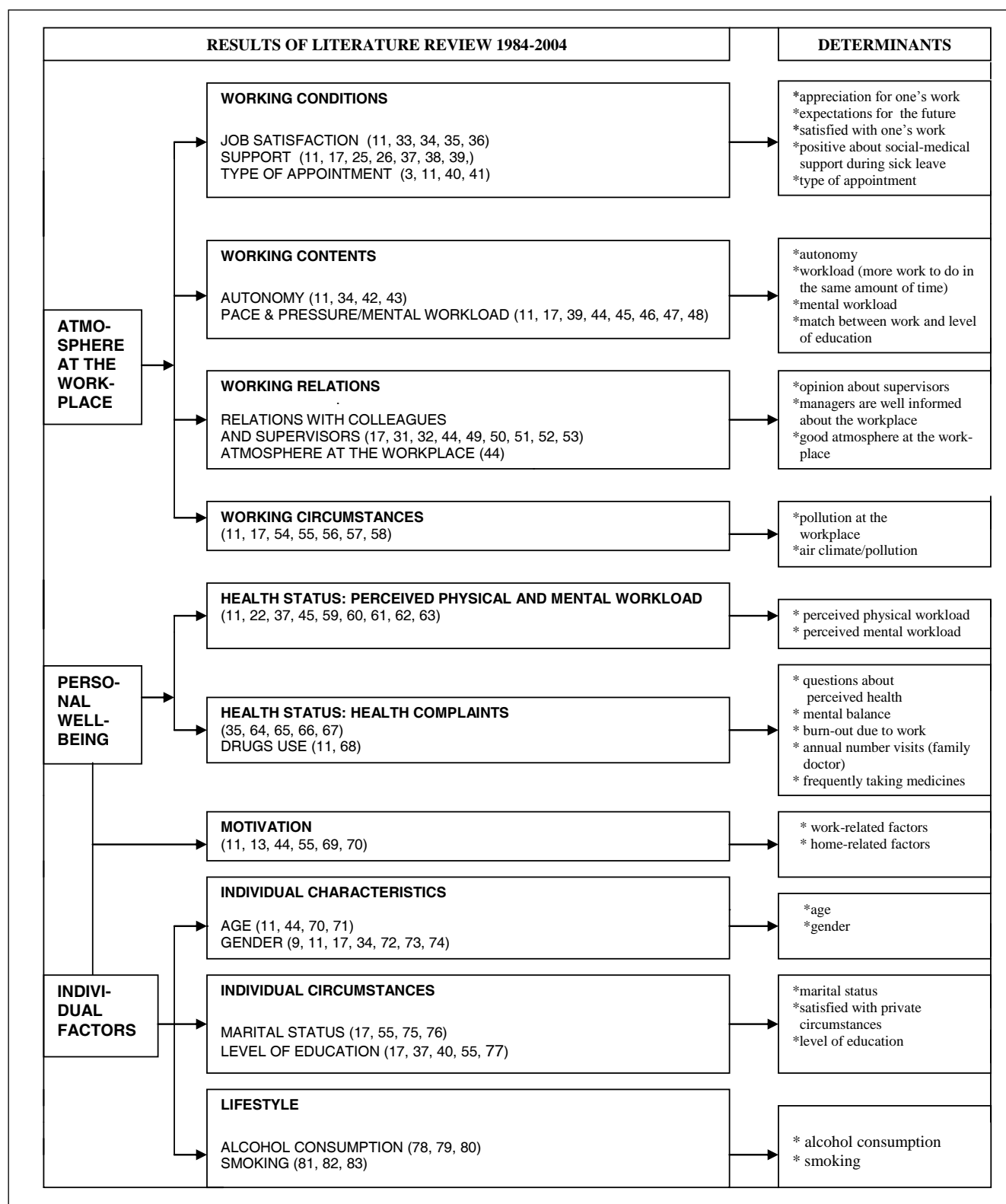


Fig. 2. Results of literature review 1984–2004/Determinants*.

* Figure belonging to: Willibrord Beemsterboer et al. (2008): The influence of sick leave frequency determinants on homogeneous groups in two socio-economically comparable, but socio-culturally different regions in the Netherlands.

Participants

Workers were included in the study population as soon as they reported sick and unable to work. This was the best possible moment because most of those reporting sick (>95%) were visited by a controlling official within a week.

In order to exclude specific effects of younger (<20 years) and older (>40 years) subjects on the results and to enhance the homogeneity of the study population, participants had to be between 20 and 40 years old and their reason for reporting sick had to be 'low back pain' or 'uncomplicated stress', that is of

Table 1. Selected determinants, interpretation of scores

Independent determinants	Number of items	Cronbach's α	Meaning of the score ¹
WORKING CONDITIONS			
appreciation for one's work (<i>sum</i>)	4	0.78	high is more > lfsl
expectations for the future (<i>sum</i>)	4	0.80	high is better > lfsl
satisfied with one's work (<i>yes=1/no=0</i>)	1		high is more > lfsl
positive about social-medical support during sick leave (<i>yes=1/no=0</i>)	1		high is more positive: indifferent ²
type of appointment (<i>permanent=1/temporarily=0</i>)	1		indifferent
WORK CONTENTS			
autonomy (<i>sum</i>)	8	0.77	high is more > lfsl
workload (more work in same amount of time) (<i>yes=1/no=0</i>)	1		high is more > hfsl
mental workload (<i>yes=1/no=0</i>)	1		heavier > hfsl
match between work and level of education (<i>yes=1/no=0</i>)	1		high is better > lfsl
WORKING RELATIONS			
opinion on supervisors (<i>sum</i>)	9	0.90	high is more positive > lfsl
managers are well informed about the workplace (<i>yes=1/no=0</i>)	1		high is better > lfsl
good atmosphere at the workplace (<i>yes=1/no=0</i>)	1		high is better > lfsl
HEALTH STATUS (perceived workload):			
perceived physical workload (<i>sum</i>)	10	0.77	high is more > hfsl
perceived mental workload (<i>sum</i>)	5	0.72	high is more > hfsl
HEALTH STATUS (health complaints):			
questions about perceived health (<i>sum</i>)	22	0.86	high is more perception of poor health > hfsl
mental balance (<i>sum</i>)	21	0.86	high is more out of balance > hfsl
burnout due to work (<i>sum</i>)	6	0.72	high is more severe > hfsl
annual number of visits (family doctor)	1		more is poorer health > hfsl
frequently taking medicines (<i>yes=1/no=0</i>)	1		more is poorer health>hfsl
MOTIVATION			
work-related factors (<i>yes=1/no=0</i>)	1		high is more pleasure in work > lfsl
home-related factors (<i>sum</i>)	8	0.70	high is less motivated for work > hfsl
INDIVIDUAL CHARACTERISTICS AND CIRCUMSTANCES			
age	1		older > lfsl
gender (<i>w=1/m=0</i>)	1		female > hfsl
marital status (<i>married=1/not married=0</i>)	1		married > lfsl
satisfied with private circumstances (<i>yes=1/no=0</i>)	1		more > lfsl
level of education (<i>high=1, vocational school level=0</i>)	1		high > lfsl
alcohol consumption (<i>yes=1, no=0</i>)	1		drinking > hfsl
smoking (<i>yes=1, no=0</i>)	1		smoking > hfsl

¹Interpretation of score and – based on the literature review performed – the assumed effect on the frequency of sick leave (**lfsl** = lower frequency of sick leave; **hfsl** = higher frequency of sick leave). ²Indifferent: literature is scarce or ambiguous.

a non-psychiatric character. The decision to use these diagnostic categories had a pragmatic basis: it was assumed that, using these *commonly found* diagnoses which – other than specific diseases – leave the subject much freedom to act (i.e. to report sick or not), a substantial number of participants (at least 50 to

100 per region) could be recruited within a relative short period of time (6 months). 184 employees (79 in Utrecht, 105 in South Limburg) agreed to participate. All employees who agreed to participate ($N = 184$) really did participate in the study. Strictly individual characteristics such as age and gender were the only

determinants of the non-responding group to be included in the statistical analysis.

It is recognised that the sample size is small, even if the study examined what effects differences in regional socio-cultural character might exercise on the type of determinants that affect sick leave frequency. This is why the study was carried out on strictly homogeneous groups in socio-economically similar though geographically different regions, under the jurisdiction of a uniform social security system.

Questionnaire

Some data on the individual and work characteristics of participants were derived from a specific form, completed by the employer and sent to the social fund to report the first day of sick leave. When employees agreed to participate, a booklet with questions was handed out which they were asked to answer. In accordance with the results of the literature review until the early nineties, the booklet consisted of sets of questions that referred to the determinants identified. The questions were derived from the validated VAG (Vragenlijst Arbeid en Gezondheid, Questionnaire on Work and Health) (88).

Figure 2 presents the origins of the questions. The figure reflects the finding that the results of the literature review showed a remarkable consistency over the years 1984–2004. Determinants belonging to similar categories were combined. Thus, the categorized determinants constitute the *independent* variables while sick leave frequency is the *dependent* variable.

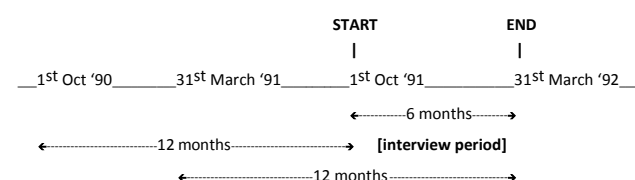
Parameters of social and demographic developments were not investigated because legal, political and socio-economic status and developments were similar throughout the country and the study population was homogeneous.

The selected determinants cf. Figure 2 were used as the basis for statistical analysis.

In *South Limburg* 82% of the distributed booklets was returned, in *Utrecht* this was 63%.

Timetable

A study of the mean frequency of sick leave requires a certain period of registration which, in the present study, was the year before the day of reporting ill. For those reporting sick on the first of October, 1991, we referred to the period starting on the first of October, 1990; for those reporting sick on the first of December, 1991, we referred to the period starting on the first of December, 1990, and so on. The mean frequency of sick leave in the referred year was used in the analyses. As a result, the time line of the study, including the 12-month period preceding the spell of sick leave, was as follows:



Determinants, Design of the Study

The collected answers (items) were classified for statistical purposes and, based on a factor analysis (not presented here), combined to form *compound determinants*. Table 1 provides

a classification of the determinants in accordance with those in Fig. 2; it gives the number of items as well as Cronbach's α for compound determinants.

The level of Cronbach's α was fixed on 0.70 as this was a rather safe procedure in the sense that the value is less dependent on the number of items (constituting the compound determinant) than if higher levels are used (89). A few compound determinants lacked internal coherence (Cronbach's $\alpha < 0.70$) and were eliminated. They were 'pollution at the workplace' and 'air climate/pollution' of the *working circumstances*.

Fig. 3 presents the study design. The relations between similar sets of sick leave frequency determinants, on the one hand, and sick leave, on the other, were analyzed for homogeneous groups in *Utrecht* and *South Limburg*. The resulting outcomes for the two regions were then compared.

A missing data analysis was performed in order to find out whether the number of missing data might influence the results. If so, imputation was applied. Consequently, the potential effect of missing data on the outcome was estimated. A *box plot* was performed to check the potential effect of extreme/outlying scores on the outcome.

A significance level of $p < 0.05$ was applied.

Statistical Analysis

The statistical analysis included: (a) a dependent group *t* test; (b) an independent sample *t* test; (c) regression analyses per region; (d) a comparison of the regression coefficients for the two regions (90) and (e) a regression analysis in order to find any correlations between the determinants in which the regions differ.

RESULTS

As far as demographic data were concerned, the average age in *South Limburg* was 26.5 years, in *Utrecht* 26.8 years. In *South Limburg* the percentage of female participants was 87%, in *Utrecht* 84%; in both regions, the majority of participants had low levels of education (vocational school level): *South Limburg* 84%, *Utrecht* 94%. Thus, the two study populations were remarkably similar in nature.

We now turn to the five subquestions of the study, to be followed immediately by the research question itself.

1. *How does sick leave frequency compare between homogeneous groups in different regions?*

Statistical comparison of the mean frequency of sick leave between the two regions showed a difference (t-value: 3.70, $p: 0.001$) between the mean frequency of sick leave a year in *South-Limburg* (1.92 spells; sd: 1.71, N: 102) and that in *Utrecht* (1.10 spells; sd: 1.23, N: 71). In a number of cases (3 in *South Limburg*, 8 in *Utrecht*) the social fund was not able to provide the exact sick leave frequency data per individual or these data were not reliable, so that these were missing cases.

2. *How do scores of individual sick leave frequency determinants compare between homogeneous groups in different regions?*

In *South Limburg* as compared to *Utrecht*: the subjects perceived a poorer health ('health status': health complaints, $p: 0.03$) and the number of married people was higher ('individual characteristics and circumstances': marital status, $p: 0.01$).

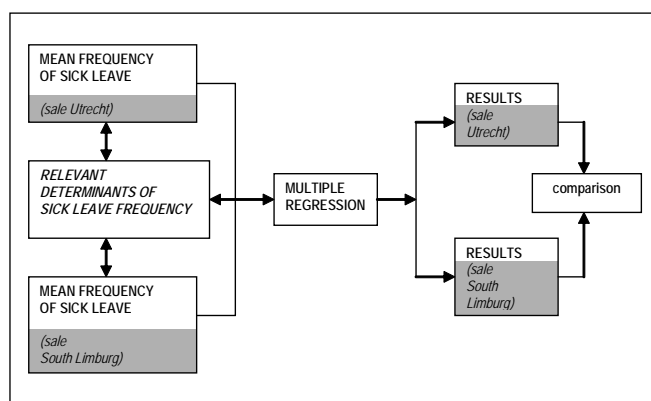


Fig. 3. Study design*.

* Figure belonging to: Willibrord Beemsterboer et al. (2008): *The influence of sick leave frequency determinants on homogeneous groups in two socio-economically comparable, but socio-culturally different regions in the Netherlands.*

3. How does sick leave frequency relate to relevant determinants between homogeneous groups in different regions?

A regression analysis was applied to examine the relation between the selected determinants as independent variables and the mean sick leave frequency as the dependent variable (Table 2).

Estimated variance components should theoretically be non-negative. As relative small components of the variance with a negative sign are generally a consequence of a small sample size, those variance components were substituted by 'zero'.

In *South-Limburg* a lower sick leave frequency was seen if one was positive about social-medical support during sick leave ('working conditions', $p:0.01$) and a higher sick leave frequency was observed if one had a permanent (and not temporary) appointment ('working conditions', $p:0.02$) and in case of a larger number of annual visits to the family doctor ('health status': health complaints, $p:0.04$); in *Utrecht* – a remarkable though not significant result – a higher sick leave frequency was seen in case of more autonomy ('work contents': autonomy, $p:0.07$), whereas in *South-Limburg* more autonomy, though not significant either, lead to a lower sick leave frequency ('work contents': autonomy, $p:0.05$).

4. Are there any differences in determinants that predict sick leave frequency between homogeneous groups in different regions?

The outcomes of the comparisons that were made to establish

differences in regression coefficients between the two regions, if any, lead to the conclusion that regional differences were found for the determinants called 'positive about social-medical support' ($p<0.01$), 'type of appointment' ($p:0.04$), 'autonomy' ($p<0.01$) and 'annual number of visits (family doctor)' ($p:0.02$).

Thus, the regression analysis showed that, though not significant for 'autonomy', regions differed in predictive determinants of sick leave frequency and that the regression coefficients for those determinants differed as well.

5. Are the determinants in which regions differ correlated?

Differences between the regions were found for several determinants (subquestion 4). In order to find a possible correlation between those determinants a regression analysis was performed for the working conditions determinants 'positive about social-medical support' and 'type of appointment', for the work contents determinant 'autonomy' and for the health status determinant 'annual number of visits (family doctor)'. The correlation matrix showed that the determinants 'positive about social-medical support' and 'autonomy' were correlated (0.19 , $p: 0.005$) as were the determinants 'type of appointment' and 'autonomy' (0.15 , $p: 0.02$). The Variance Inflation Factor (range 1.03 – 1.06) did not show any co-linearity of these determinants.

The determinants 'alcohol consumption' and 'satisfied with private circumstances', belonging to the category 'individual characteristics and personal circumstances', met so many missings ('alcohol consumption') or showed such an extent of skewness ('satisfied with private circumstances'), that they were less relevant for further analysis and therefore had to be excluded. The performed boxplot showed that several determinants had extreme/outlying scores. Most of them did not influence the outcome except for the determinants 'autonomy' (South-Limburg) and 'autonomy' and 'work-related factors' (Utrecht), in the sense that only after reducing the value of the extremes/outliers of these determinants to the next extreme score or the mean value, the strong relation between them and frequency of sick leave did exist.

The main question of the study was: *Are there any differences in the determinants of sick leave frequency between homogeneous groups in different regions within the same country?*

Based on the results of the statistical analyses it was concluded that, within our country, regional differences in sick leave frequency determinants really did exist and that different determinants predicted sick leave frequency in different regions.

Table 2. Results of the regression analyses of sick leave frequency determinants per region

	UTRECHT			SOUTH-LIMBURG		
DETERMINANTS	adjusted R ²	β	Sig T	adjusted R ²	β	Sig T
WORKING CONDITIONS	0.00 ¹ (N=49)			0.10 (N=85)		
positive about social-medical support during sick leave		-0.02	0.93		-0.30	0.01*
type of appointment		-0.06	0.73		0.27	0.02*
WORK CONTENTS	0.07 (N=45)			0.01 (N=67)		
autonomy		0.28	0.07		-0.26	0.05
HEALTH STATUS: HEALTH COMPLAINTS	0.01 (N=49)			0.09 (N=75)		
annual number of visits (family doctor)		-0.11	.53		0.27	0.04*

* $p<0.05$

¹ negative R² substituted by 'zero'

DISCUSSION

The present study compared the responses to relevant determinants of sick leave frequency shown by homogeneous groups in two areas of similar socio-economic character. Employment contracts in the two regions were similar, as was the administrative implementation of social security regulations. Employees who did not speak or write Dutch – most of them belonging to other ethnic groups – were not invited to participate as they would have been unable to fill in the interview booklet. Furthermore, in selecting both the ‘Utrecht region’ with the city of Utrecht and its immediate surroundings and the ‘South Limburg region’ including the cities of Heerlen and Maastricht, a balance of rural and urban qualities was reached which also attributed to the homogeneity of the study populations. However, taking into account a few indicators, this did not rule out the possibility that the two regions differed in character. Thus, over the years, a relatively large number of employees has come to depend on disability benefits or has become unemployed in South Limburg than has been the case in the western part of the country; further on it turned out that residents of the South Limburg area show a poorer perception of their own health than residents elsewhere in the country (86, 87). The assumption is that these differences have been caused by similar phenomena as are the differences in determinants of sick leave frequency, that is to say, socio-cultural differences.

Methodological Reflections

The Topicality of the Study

Sick leave frequency has gradually decreased in the Netherlands. At the same time, as a result of changes in the organization of the social security system, regional registrations of sick leave frequency have ceased to exist. This does not mean, however, that regional differences in sick leave frequency have ceased to exist. Since 2003 the Nationale Verzuimstatistiek (Statistics Netherlands, 2006) has been providing sick leave registration per Dutch province and what it shows is that there are still differences in sick leave between provinces (91). Moreover, although the study was carried out during the 1990s, the consistency in determinants predicting frequency of sick leave adds to the relevance of its outcome.

Although the changes of the social security system have affected the country as a whole rather than specific regions, the social security system for the certification of sick leave has grown less uniform. Therefore, apart from the independent determinants presented in this study which are still effective today, future studies on regional differences in sick leave will have to include determinants of the statutory compensation system as well.

The present study seeks to find an explanation for regional differences in sick leave and applies an original research model to achieve this. The model assumes the existence of regional differences in sick leave on the basis of socio-cultural differences, which find their expression in well-known sick leave determinants. Changes in the organisation of the social security system will not alter the present theoretical model as such and at the time when the study was performed, the two regions had the same statutory compensation system, i.e. employees reporting sick were met with a similar approach.

Subjects

Subjects for the study were recruited at a time when they reported sick. An alternative for this approach would have been a study among employees of a few big companies. The latter approach would have been a better alternative to cover the entire group of workers in sale. In the present case, only those were included who, at some point, reported sick. So it was for practical reasons that we decided to use this procedure. Relevant individual data as well as systemically registered individual absenteeism data could easily be obtained from the social fund. Actually, it would have been a great disadvantage to study the employees of a few big companies because the outcome might be strongly affected by their specific, company-related culture of absenteeism (92, 93). In this context it is important to mention the exclusion of company-specific characteristics that often play an important role in sick leave behaviour (94, 95).

A choice for the Age Group of 20 till 40 Years

In order to exclude specific effects of younger (<20 years) and older (>40 years) subjects on the results and to enhance the homogeneity of the study population, a choice was made for the age group of 20 till 40 years. It is recommended to repeat the study with study populations older than 40 years as to see whether these groups, as a consequence of socio-cultural factors, show regional differences in sick leave too.

Number of Spells of Sick Leave

By starting from a reported case of sick leave to recruit participants, participants seem to have had at least one spell of sick leave during the study period and so-called ‘zero’ sick leaves seem to have been excluded. However, this assumption is not correct. The time we referred to was the 12-month period *preceding* the first day of sick leave. Thus, it is always possible that participants had a ‘zero’ frequency of sick leave. Meanwhile, once people report sick for work they apparently show a greater tendency to have another sick leave than people who never did (96), so the results of this study are representative for those employees who were on sick leave at some point in time rather than for those who never had sick leave before.

Analysis per Category

It would have increased our understanding of the association between determinants and observed sick leave frequency if the entire group of selected determinants could be analysed in a single regression analysis. However, a regression analysis of all selected determinants was not a real option. The number of participants actually participating in the analysis (*N*) would have been quite small due to the number of missing data. This would have made the estimates of the regression analysis unreliable. Thus, for pragmatic reasons the determinants were classified according to the categories they belonged to and then analysed *per category*. Also, considering the possibility that determinants distinguishing between regions were correlated, a regression analysis for the relevant determinants was performed.

Possible Correlations between the Independent Determinants

In interpreting the outcome it should be realized that possible correlations between independent determinants were not the ob-

ject of study, although such correlations may exist. For instance, a notable gender-related effect may be correlated with factors like social circumstances and the work situation (70, 97–99). In developing a policy to reduce the mean frequency of sick leave in a specific region it will be necessary to take into account any correlations between determinants before drawing conclusions.

Study Results and Level of Significance

Some determinants showed notable results. This was a reason to consider also $0.05 < p < 0.10$, in addition to $p < 0.05$. After all, using only the 5% significance level in applied research may be inappropriate (100). Such a conservative approach may provide policy-makers with an unnecessarily incorrect picture, at least when correlations above the 5% level are not taken into consideration. Therefore, we have distinguished results for which $p < 0.05$ and results for which $0.05 < p < 0.10$. As for the determinants 'autonomy' and 'annual number of visits (family doctor)' the opposite sign of the β values (Table 2) attributes to the difference in effect of this determinant in the two regions. Moreover, the higher number of annual visits to the family doctor in South Limburg confirms the perception of a poorer health (subquestion 2) which confirms both earlier and later findings in this region (86, 101). The outcome supports the conclusion that, between regions, different determinants may predict frequency of sick leave and that the underlying causes are region-related.

If employees, in *South-Limburg*, were positive about social-medical support during sick leave and met a certain autonomy at the workplace, they had a tendency to a lower frequency of sick leave whereas a permanent appointment and a larger annual number of consultations of the family doctor lead, in this region, to a higher frequency of sick leave. The paradoxical finding, in Utrecht, of autonomy having a heightening effect on frequency of sick leave, needs further research for its possible cause.

CONCLUSIONS

If a study uses homogeneous groups, then *comparable* determinants can be expected to affect sick leave frequency in either group. That this is not the case has its implications for the nature of interventions per region. In case nationwide, general measures to reduce frequency of sick leave are intended, one has to take into account that determinants that predict frequency of sick leave may differ and that only tailor-made interventions, focussed on those determinants that predict sick leave frequency per region, may be effective.

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