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The long term success of occupational non-smoking seminars

The staff members of a leading Austrian industrial company were offered comprehensive non-smoking seminars within the scope of health promotion in the workplace. The results of the accompanying long term monitoring are now available.

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The Employee Protection Law prohibits smoking when working together with non-smokers in order to protect the latter from lung cancer and other diseases caused by passive smoking. Many employees in fact want to give up smoking but need professional help. It was therefore decided to offer the employees of one of Austria's leading industrial companies a six hour non-smoking seminar based on the Allen Carr® [1] method, on a complimentary basis outside of working hours, within the scope of health promotion in the workplace. Also included was the option of attending an advanced seminar if required. In order to reach as broad a base as possible all employees were sent an application form for the non-smoking seminar which was also open to family members and colleagues from other companies. The seminars (including the advanced seminar) were held at the workplace and were attended by 1 311 participants during the period November 1999 to December 2001. A telephone survey based on a random sample from among the participants was carried out in order to evaluate the long term success of the non-smoking measures. The survey also included methods from an earlier study [2] in order to test hypotheses (such as the positive influence of group dynamics for example) which had been drawn up following the first study.

Methods

Staff members from the company's health service carried out the telephone survey. The selection of the interviewees was based on two criteria. Firstly, as it was the intention to establish as long a post-monitoring period as possible, participants from the seminars with earlier dates were preferred. Secondly, those participants whose telephone numbers were easy to obtain were selected. While the seminars were also open in principal to partners and employees from subsidiary and related companies, employees from the own company were over represented in the survey. A total of 686 people were selected for the random survey. An individual was considered to be unreachable after four failed attempts to make contact. The participants were provided with comprehensive questionnaires. In the event that a participant declined to complete these questionnaires they were asked to at least provide details of their current smoker status. All details were saved anonymously in table format wherein a department code was also included. This enabled the evaluation to establish how many of the test subjects from the same department took part in the survey but without including details of which department. Urine samples from a partial representation of the participants (61 people) were tested for cotinin in order to verify the current smoker status results. In consultation with the Works Council, the urine samples used were samples taken from 30 smoking and 30 non-smoking survey participants during the course of a health check with the health service between June 2004 up until the target number of participants was reached. Four key points were selected for the determination of the seminar's success and were analysed for possible influence factors:

(i) Influences on the smoker status

(smoker versus non-smoker at the time of the survey) were verified using logical regression.

(ii) The number of cigarettes (per day) at the time of the survey was not along a normal curve distribution and was therefore divided into four categories:

No cigarettes, less than 20, approximately 20 and more than 20 cigarettes per day. The influences were verified on the basis of ordinal regression.

(iii) The difference (prior to the seminar versus the time of the survey) in the number of cigarettes smoked daily was also selected as a key point. Linear regression was applied since the difference increasingly corresponded to a normal curve distribution.

(iv) Influences on the duration of abstinence were analysed using Cox regression.

IMAGE

The prohibition of smoking in the workplace proved to have the most influence on the total number of cigarettes smoked.

Multiple regressions resulted in the following four thematic blocks:

- (a) Descriptors of the original smoking behaviour: number of cigarettes (daily) prior to the seminar, smoking duration (years).
 - (b) Personal data: gender, age, socio-economic factors (shift work, worker/employee).
 - (c) Details of state of health prior to the seminar (general state of health in five categories from “excellent” to “bad”, susceptibility to infection in five categories from “very low” to “very strong”, weight).
 - (d) Psychosocial influences on smoking behaviour and/or the seminar’s success:
the number of seminar participants (and/or survey participants) from the same department, partner’s smoking behaviour, the strength of the will to give up, prohibition of smoking in the workplace.
- All computations were made on the basis of the whole group. In addition, specific models used for the female participants and for relapsed smokers were evaluated separately. The timing of the seminar (earlier or later date) and the affiliation to the main company, both of which influenced the inclusion in the sample test, were evaluated separately. The influence on the seminar’s success of weight changes and state of health was determined by means of linear regression (weight) and/or ordinal regression (state of health, susceptibility to infection). The cotinin content in the urine samples was evaluated quantitatively between 10 and 2 500 ng/ml. Values outside of this range were registered as <10 and/or >2.500. Since no standard distribution was presented the rank correlation between cotinin concentration and the current number of cigarettes smoked was calculated.

Results

The telephone survey during the period from December 2003 to November 2004 was targeted at 686 participants from the initial seminars from November 1999 to December 2001. 171 of these could not be reached despite four attempts. Of the remaining 515 people (75 percent), 5 (one percent of those contacted) refrained to give any response at all. 27 people answered only the minimal question regarding current smoker status (5.2 percent of those contacted, of which 13 were non-smokers and 14 were smokers at the time of the survey). Most of the remaining 483 people completed the comprehensive questionnaires in full. There were only a few people who did not want to provide certain personal details. 28 percent of those surveyed were female and 72 percent were male. Of the 483 people surveyed and who provided substantially complete questionnaires, 249 (51.6 percent) stated that they no longer smoke following the seminar, while 234 (48.4 percent) had relapsed. Assuming that the five people who declined to provide any information had also relapsed, the relapse quota amounts to 49.1 percent. 475 people answered the question about the use of a nicotine replacement therapy. Only 12 of them indicated that they had used such a preparation at any point in time. Only two of them remained non-smokers while ten had relapsed despite the nicotine replacement. In contrast, 246 non-smokers and 217 relapsed smokers had not used a nicotine preparation. The use of a replacement preparation was therefore associated with a 5.7 times higher risk of relapse ($p = 0.017$ in the exact Fischer Test). However, the number of users of a replacement preparation was too low to achieve a reliable test of the influence thereof via multiple regression. As the Kaplan-Meier-Chart shows (Figure 1), the telephone surveys took place between two and four and a half years after the seminar (arithmetical mean: 3 years). The proportion of non-smokers hardly changed during this period such that the timing of the survey can be considered to have been selected at a sufficient interval from the seminar to allow a statement of the long term success.

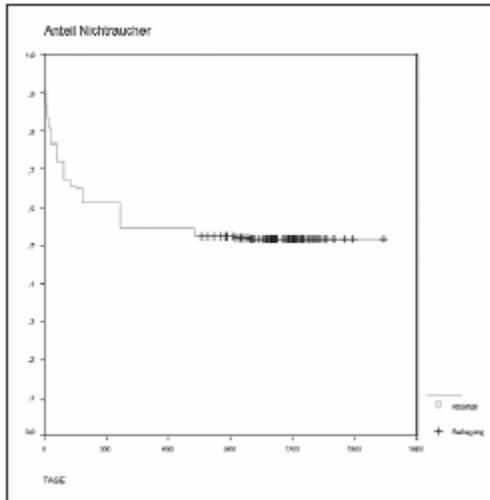


Figure 1: Proportion of non-smokers in terms of time after seminar participation

Table 1

	Raucherstatus (logistische Regression)		Zigaretten- anzahl (ordinale R.)		Differenz Zigaretten (lineare R.)		Abstinenzdauer (Cox- Regression)	
	RR	p	Koeff.	p	Koeff.	p	RR	p
Ursprüngliches Rauchverhalten								
Anzahl der Zigaretten / Tag	< 1	0,12	-	0,33	-	-	0,989	0,087
Raucherjahre	-	0,31	-	0,34	-	-	-	0,46
allgemeine Personendaten								
männlich	0,662	0,071	-	0,38	5,668	< 0,001	0,731	0,050
Alter (je 1 Jahr)	0,982	0,095	-	0,28	0,340	< 0,001	0,988	0,10
Schichtarbeit	-	0,5	-	0,85	-	0,54	-	0,68
Arbeiter	1,476	0,057	0,51	0,005	-	0,21	1,318	0,058
Gesundheitszustand (vor)								
Körpergewicht	-	0,38	0,016	0,01	-	0,71	-	0,61
Allg. Gesundheit	0,697	0,004	-0,296	0,013	4,446	< 0,001	0,808	0,011
Infektanfälligkeit	0,726	0,002	-0,369	< 0,001	2,474	0,001	0,785	0,002
psychosoziale Faktoren								
Rauchverbot an Abteilung	-	0,68	-	0,58	-	0,74	-	0,49
Stärke des Wunsches aufzuhören	-	0,68	-	0,23	-	0,72	-	0,95
Teilnehmer aus Abteilung	0,922	0,001	-0,073	0,002	0,448	0,007	0,942	0,002
Partner raucht	2,064	0,006	0,740	0,002	-3,950	0,048	1,742	0,002
	Nagelkerke		Nagelkerke		korrigiert			
R_gesamt	0,14		0,16		0,12			

Legend

Raucherstatus = smoker status
 (logistische Regression) = logical regression
 Zigarettenanzahl = number of cigarettes
 (ordinale R.) = ordinal regression
 Differenz Zigaretten = cigarette difference
 (lineare R.) = linear regression
 Abstinenzdauer = period of abstinence
 Ursprüngliches Rauchverhalten = original smoking behaviour
 Anzahl der Zigaretten / Tag = number of cigarettes/day
 Raucherjahre = years as a smoker
 Allgemeine Personendaten = general personal details

Männlich = male
 Alter (je 1 Jahr) = age (per 1 year)
 Schichtarbeit = shift work
 Arbeiter = worker
 Gesundheitszustand (vor) = state of health (prior)
 Körpergewicht = weight
 Allg. Gesundheit = general health
 Infektanfälligkeit = susceptibility to infection
 Psychosociale Faktoren = psychosocial factors
 Rauchverbot an Abteilung = smoking prohibited in department
 Stärke des Wunsches aufzuhören = strength of the will to give up
 Teilnehmer aus Abteilung = participants from the department
 Partner raucht = partner smokes

Only one person admitted to having started smoking again after a period of abstinence of more than two years (i.e. after three years). The timing of the seminar did not have any significant influence on the smoker status. Likewise, there was no difference between employees of the main company and other participants. There was also no significant influence on the number of cigarettes and the period of abstinence.

Factors influencing the seminar success in the overall group

The results of the regression calculations are given in Table 1. Overall the factors analysed accounted for about 15 percent of the variance. The results are relatively consistent over the key points analysed: The original smoking behaviour had practically no influence. The personal details in general did not prove to be very meaningful whereby workers reported a slightly lower success rate than employees and men tended to show “better” results than women. Successful seminar participants reported a bad state of health (both overall state of health and susceptibility to infection) prior to the seminar with significantly more frequency. The psychosocial factors “Partner’s Smoking Behaviour” and “Number of Survey Participants from the same Department” proved to be the most meaningful (as an indicator for the number of seminar participants in a more limited work environment).

Factors influencing the Reduction in the number of cigarettes in relapsed smokers

In the case of relapsed smokers, the factors influencing the difference in the number of cigarettes (number prior to the seminar minus the number at the time of the survey) was investigated. All of the health indicators (including weight) showed a relationship tendency at least, otherwise only age (Table 2). In the case of the total number of cigarettes smoked (independent of the number prior to the seminar) the prohibition of smoking in the workplace proved to be the most influential.

Table 2

Tabelle 2: Ausgewählte Einflussfaktoren auf den Seminarerfolg (Differenz der Zigarettenzahl bei Rückfälligen) in linearer Regression.		
Allgemeine Personendaten	Schätzer	p
Alter (je 1 Jahr)	0,142	0,026
Gesundheitszustand (vor)		
Körpergewicht	-0,083	0,045
Allg. Gesundheit	1,552	0,06
Infektanfälligkeit	1,102	0,124

Legend

Ausgewählte Einflussfaktoren auf den Seminarerfolg (Differenz der Zigarettenzahl bei Rückfälligen) = Selected Factors Influencing the Seminar Success (Difference in Number of Cigarettes among Relapsed Smokers)

Allgemeine Personendaten = general personal details
 Alter (je 1 Jahr) = age (per 1 year)

Gesundheitszustand (vor) = state of health (prior)
 Körpergewicht = weight
 Allg. Gesundheit = general health
 Infektanfälligkeit = susceptibility to infection

Factors influencing the seminar success among women

Since only 28 percent of the survey participants were female the results for the overall group are dominated by the answers from men. With specific details there was a tendency towards a difference in the responses when the answers from women only were analysed (Table 3). In contrast to the overall group, weight prior to the seminar proved to have an influence on the success of the seminar: a higher weight increased the risk of relapsing or of relapsing earlier, reduced the reduction in the number of cigarettes and/or increased the average number of cigarettes smoked at the time of the survey. Yet, the general state of health prior to the seminar was not associated with the success of the seminar. While the partner's smoking behaviour clearly had a greater influence on women, the relationship to the number of survey participants from the same department was of less significance.

Nicotine Abstinence and State of Health after the Seminar

Three questions were posed on the subject of state of health:

Overall health in comparison to the period prior to the seminar was to be assessed: of 475 survey participants, 79 (16.6 percent) responded with "Much Better", 117 (24.6 percent) with "Somewhat Better", 272 (57.3 percent) with "About the Same" and seven (1.5 percent) with "Slightly Worse".

Nobody responded with „Much Worse“. Relapsed smokers reported a significantly worse state of health whereby this became even more noticeable with an increased number of cigarettes. The susceptibility to infection was assessed with a five-point scale for both the periods prior to and following the seminar. At the time of the survey 210 (44.2 percent) had "Very Little" susceptibility, 201 (42.3 percent) "Little", 54 (11.4 percent) "Average", three (0.6) "High" and seven (1.5 percent) "Very High" susceptibility.

Table 3

	Raucherstatus (logistische Regression)		Zigaretten- anzahl (ordinale R.)		Differenz Zigaretten (lineare R.)		Abstinenzdauer (Cox- Regression)	
	RR	p	Koeff.	p	Koeff.	p	RR	p
Ursprüngliches Rauchverhalten								
Anzahl der Zigaretten / Tag	< 1	0,167	-	0,341	-	-	-	0,997
Raucherjahre	-	0,88	-	0,319	-	-	-	0,253
allgemeine Personendaten								
Alter (je 1 Jahr)	0,968	0,091	-0,028	0,13	0,298	0,012	0,981	0,111
Schichtarbeit	-	0,546	-	0,64	-	0,848	-	0,737
Arbeiter	-	0,597	-	0,701	-	0,212	-	0,69
Gesundheitszustand (vor)								
Körpergewicht	1,036	0,063	0,041	0,01	-0,248	0,015	1,021	0,062
Allg. Gesundheit	-	0,879	-	0,827	2,402	0,074	-	0,918
Infektanfälligkeit	0,683	0,044	-0,415	0,02	2,404	0,028	0,745	0,027
psychosoziale Faktoren								
Rauchverbot an Abteilung	-	0,92	-	0,371	-	0,706	-	0,643
Stärke des Wunsches Aufzuhören	-	0,622	-	0,961	-	0,257	-	0,978
Teilnehmer aus Abteilung	0,905	0,184	-	0,678	-	0,534	-	0,422
Partner raucht	5,721	0,021	1,617	< 0,001	-	0,359	2,764	< 0,001

Legend

Raucherstatus = smoker status
 (logistische Regression) = logical regression
 Zigarettenanzahl = number of cigarettes
 (ordinale R.) = ordinal regression
 Differenz Zigaretten = cigarette difference

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Raucherjahre = years as a smoker
Allgemeine Personendaten = general personal details
Männlich = male
Alter (je 1 Jahr) = age (per 1 year)
Schichtarbeit = shift work
Arbeiter = worker
Gesundheitszustand (vor) = state of health (prior)
Körpergewicht = weight
Allg. Gesundheit = general health
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Stärke des Wunsches aufzuhören = strength of the will to give up
Teilnehmer aus Abteilung = participants from the department
Partner raucht = partner smokes

Both the number of cigarettes smoked and the smoker status increased the susceptibility to infection at the time of the survey (assessed on the basis of the susceptibility to infection following the seminar). Weight prior to the seminar and at the time of the survey was assessed. In comparison to the relapsed smokers, the abstainers showed a weight increase of about 100g per cigarette per day.

Cotinin Concentration in the Urine

Urine samples were available from 61 people, of which 31 indicated that they were non-smokers and 30 smokers. The correlation between smoker status and cotinin findings (Kappa) was high and amounted to 0.84 for both of the cut-off values 100 ng/ml and 450 ng/ml and 0.9 for 600 ng/ml. The rank correlation according to Spearman indicated a Rho of 0.84 between the number of cigarettes and the cotinin concentration.

Discussion

The success of support which is offered in the workplace to smokers who want to give up has been confirmed on more than one occasion [3-5]. In general it is evident that group therapy is not only more efficient but is also more effective than the individual efforts of a single smoker or even low intensity medical intervention [6, 7]. The strengths of this study are the long post-monitoring period averaging three years and the chemical laboratory analysis of the details from a part of the collective. The extensive data enabled the evaluation of a variety of success criteria (smoker status at the time of the survey, number of cigarettes per day, period of abstinence). The results proved to be extremely consistent in all of the models tested. Possible weaknesses are the not completely randomised sample of the survey participants, the high proportion of unreachable (despite repeated attempts) seminar participants (25 percent) and the lack of a control group. The selection of the survey participants lead to an accumulation of participants from the earlier seminars and employees from the main company. However, neither of these aspects relating to the group of survey participants had any influence on the seminar's success. A greater success rate in the telephone contact was not attainable under the working conditions at the company's health service. Since primarily only name lists for the seminar participants were available and these had to be compared with the (company) telephone directory in order to establish at least telephone contact, there was a lack of any information on noticeably relevant differences between the last persons that were contacted and those that were unreachable. Factors which might possibly have influenced the telephone contact were age, gender and the conditions at the workplace (shift work, worker versus employee). With the exception of the differentiation between worker and employee, all of these factors had only a minor influence on the success of the seminar among the group of survey participants. It is conceivable that some of the workers in the company were more difficult to reach on the telephone than the employees. As the seminar success was shown to be somewhat lower among the workers, this would lead to a slight overrating of the seminar success. The success rate of around 50 percent over an average three year monitoring period is nevertheless remarkable. Even in the workers group the relapse quota

remained at under 60 percent (Figure 2). The use of nicotine preparations did not play a significant role among the survey participants. These are not promoted in the Carr method used for the seminars and it is conceivable that the twelve users of nicotine preparations would have turned to medical support once there was a likelihood of their relapsing.

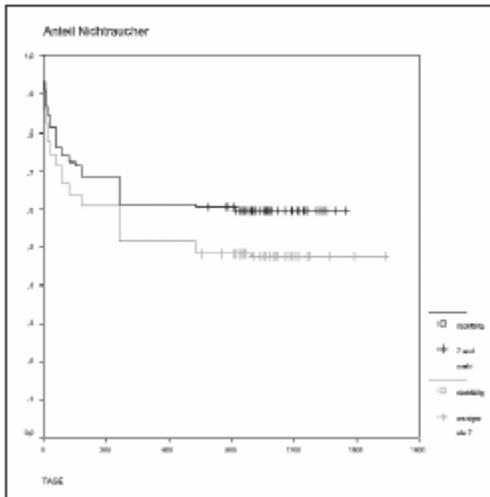


Figure 2: Differences between Workers and Employees

Legend:

- rückfällig – started smoking again
- 7 und mehr – 7 and more
- rückfällig – started smoking again
- weniger als 7 – less than 7

Nobody admitted to having used any other medical support for giving up, such as Bupropion. There were a few personality aspects which had a significant influence on the seminar’s success. These primarily include the psychosocial factors such as the partner’s smoking behaviour (Figure 3) and the number of seminar participants from the same department. The number of participants from the same department could only be determined indirectly, however, since only the number of participants from the department was known. This analysis therefore also had to be limited to the employees of the main company in order not to falsify the results through preferential surveying.

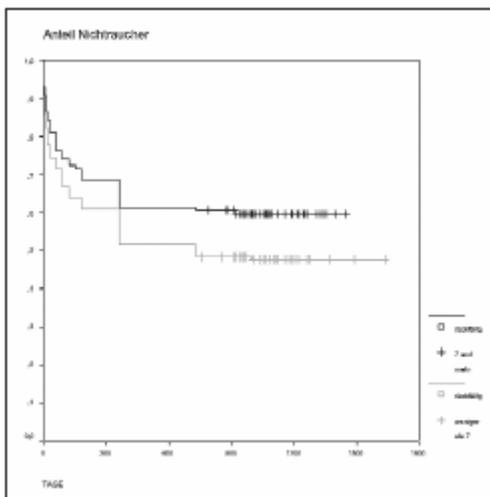


Figure 3: Influence of the Partner's Smoking Behaviour

Legend:

rückfällig – started smoking again

7 und mehr – 7 and more

rückfällig – started smoking again

weniger als 7 – less than 7

Despite the impact of the analysis being thereby reduced and the use of an approximation parameter instead of the actual number of seminar participants, the results are surprisingly clear-cut and highly significant. Figure 4 provides a graphic portrayal of the influence of the department, wherein two groups with approximately the same cut-off value of seven participants are shown. It may be concluded that, in addition, to the quality of the seminar, psychosocial factors did actually make a significant contribution to the success. The relevance of the company health promotion programme is thus clearly emphasised.

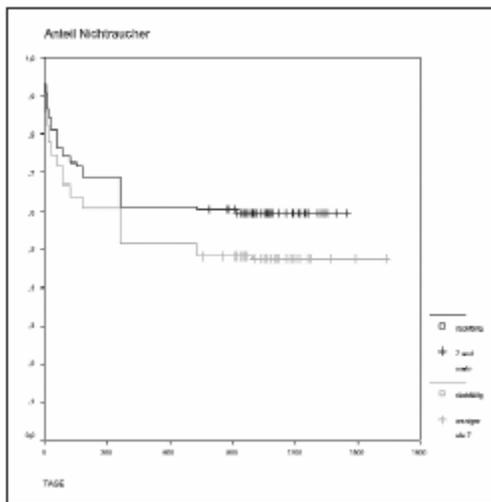


Figure 4: Influence of the Number of Survey Participants in the Same Department

Legend:

rückfällig – started smoking again

7 und mehr – 7 and more

rückfällig – started smoking again

weniger als 7 – less than 7

The study shows that non-smoking seminars within the scope of health promotion in the workplace have significant positive repercussions for the company

A smoking history, on the other hand, had much less influence on the seminar success. In fact, the success rate seemed to increase somewhat with the number of cigarettes smoked prior to the seminar. It could be, however, that successful seminar participants assessed their original smoking behaviour more realistically or even exaggerated it in order to emphasise their success, while relapsed smokers tended to play down their dependency. However, in the case of the current number of cigarettes smoked, which then again showed a high correlation with the number of cigarettes prior to the seminar, there was a very high correlation with the laboratory findings such that a significant tendency towards false statements can be eliminated. The prohibition of smoking in the workplace reduced the number of cigarettes smoked among the relapsed smokers. This is plausible because the prohibition significantly limits the times during the day in which the individual in question can indulge his habit. Other authors [8, 9] have found a higher withdrawal rate in connection with smoke-free workplaces. The influence of the smoking prohibition may well depend upon the related message: where the “junior employee” may not smoke in the open-plan office (out of consideration for the colleagues in the same office) while his superior sitting in his own office may do so, then the prohibition might be much less effective as in a company where “smoke free” is

generally recognised as an overall objective. The observation that successful seminar participants tended to report a worse state of health prior to the seminar must be treated with caution. It is true that a bad state of health can be a motivation to give up. Yet it also part of the method of the seminars offered to render the positive side of a “smoke-free life” tangible. Those who were attracted to the seminar would consequently be those who had better learnt how to assess their previous state of health and therefore had better prospects for success. Therefore it cannot be deduced from this study that 87 percent of the changes to the state of health are derived from the seminar’s success. The successful seminar improved the actual state of health and the susceptibility to infection decreased according to the participants’ own statements. The objective facts that the subjective health parameters improve after giving up smoking are not in dispute. However, the psychological problem in dependency therapy lies in the fact that these changes take place too slowly for them to be noticed by the individual in question while the acute stimulating effect of nicotine does indeed make itself felt. It speaks for the seminar method that it was able to stimulate the awareness for the long term health changes. In comparison, the average 3.7 kg more weight of non-smokers as opposed to relapsed smokers ought to be negligible. In fact, it was only among women that weight tended to have an influence on the seminar success. The seminar was therefore able to successfully communicate the fact that a minor increase in weight ought not to be seen as being too problematic because one can lose the weight again having successfully given up. However, physical activity should be increased while giving up and snacking avoided so as to prevent relapses which are particularly prevalent among women for cosmetic reasons [5]. Overall, the study showed that company health promotion programmes using psychosocial measures in the workplace can improve the health and well being of employees on a sustained basis. After all, such measures have positive repercussions for the company. In relation to giving up smoking, for example, these include: healthier employees, better productivity, less sick days, less early disablement, a better working environment, reduced cleaning costs, reduced fire risk and better motivation at work.

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Gesellschaft für Arbeitsmedizin
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Innsbruck

(Company group courses are more successful than conventional smoking therapy.
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