

# Comparison between two programmes for reducing the levels of risk indicators of heart diseases among male professional drivers

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## Abstract

**Objectives**—To compare two programmes for reducing the levels of risk indicators of heart diseases among professional drivers. The programmes were focused on changes of lifestyle. The aim of the programmes was to initiate and motivate a process of change within the driver, which in the long term should lead to permanent and sound health habits. One programme was based on health profile assessment and the other was a health examination.

**Methods**—Altogether, 102 subjects were investigated (51 allocated to an intervention group and 51 to a reference group). The programme in the intervention group (health profile assessment) was based on revelatory communication, adjusted to the driver and contained individual and group activities. The reference group went through a health examination. In both groups blood pressure, serum lipid concentrations, body mass index, and estimated maximal oxygen uptake were measured and the lifestyle habits were surveyed by questionnaires at the start and at follow ups of 6 and 18 months.

**Results**—The results showed that in the intervention group the maximal oxygen uptake increased, as did exercise habits and the intention to practice good dietary habits. Variable working hours was the most common obstacle to change a health habit. In the reference group the maximal oxygen uptake increased and the concentration of serum total cholesterol and the number of people who perceived stress and loneliness decreased.

**Conclusions**—Both the health profile assessment and the health examination had an effect on the levels of some risk indicators of heart diseases. Both programmes turned out to be useful because of high participation during the entire period and a generally positive attitude among the subjects.

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Several investigations have indicated that cardiovascular diseases affect professional drivers more often than many other occupational groups. This has been independent of research methods, techniques of measurements, and

material for comparison.<sup>1-7</sup> Studies have also shown that drivers are exposed to several possible risk indicators of cardiovascular diseases such as physiological risk indicators (increased blood pressure and total cholesterol concentration) and indicators related to work environment and the lifestyle.

Risk indicators related to the work environment were evaluated among 440 male professional drivers in Sweden,<sup>8</sup> and showed that significantly more drivers than referents had a work situation characterised by high demands, low decision latitude, low social support at work, and shift work. It also showed that significantly more drivers than referents were sedentary in their leisure time, smokers, overweight, and consumed a significantly higher proportion of milk fat per day. Low physical activity in leisure time,<sup>2,9,10</sup> high incidence of smokers,<sup>8-10</sup> and overweight<sup>8-11</sup> were also found among professional drivers in other studies. The excess proportion of overweight drivers could be a consequence of their eating habits and their low physical activity both at work and during their leisure time. These results indicate the importance of trying to change the lifestyle of the drivers to decrease the risk of cardiovascular diseases.

Several studies<sup>12-17</sup> have emphasised the importance of changes in lifestyle—such as diet, exercise, and antismoking programmes—rather than pharmacological intervention to reduce risk indicators of cardiovascular diseases, and encouraging people with professional support to take responsibility for health habits has been found to be important in intervention programmes. A selective preventive strategy might influence health habits in groups with marked educational inequalities<sup>15</sup> and shift work, as for professional drivers.<sup>8</sup>

Andersson<sup>12</sup> and Malmgren<sup>13</sup> developed and tested a special method of revelatory communication called health profile assessment. Its purpose was to get the person to take responsibility for health through positive health habits. The method emphasises the importance of a two way communication process and was developed within a comprehensive preventive healthcare programme at Saab-Scania in Linköping, Sweden.

The purpose of this investigation was to evaluate and compare two programmes for reducing the levels of risk indicators of heart diseases among professional drivers. The programmes were focused on changes in lifestyle. The aim of the programmes was to initiate and motivate a process of change within the

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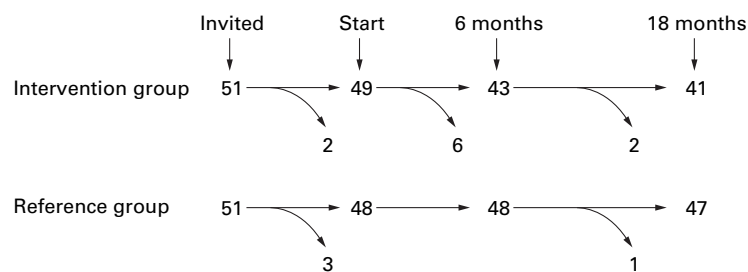


Figure 1 Number of subjects and dropouts in the intervention and reference groups at different points in the study.

individual which in the long run would lead to permanent and sound health habits. One programme was based on assessment<sup>12,13</sup> and the other programme was a health examination.

## Subjects and methods

### SAMPLES

The subjects in the two samples, the health profile assessment (*intervention group*) and examination groups (*reference group*), had participated earlier (1990) in an evaluation of risk indicators of ischaemic heart disease among professional drivers.<sup>8</sup> An invitation to participate in the study was sent to those drivers who lived within 50 km of Umeå and Skellefteå, two towns located in northern Sweden. The subjects in Umeå were the intervention group and those in Skellefteå the reference group. The drivers were selected from different towns to avoid spill over effect between the programmes.

A comparison between the drivers in the two samples ( $n=102$ ) and the remaining drivers ( $n=290$ ) in the investigation in 1990<sup>8</sup> showed no significant differences in age, education, blood pressure, concentration of blood lipids, smoking habits, consumption of fat, and shift work. However, the drivers in the two samples had lower mean values of body mass index (BMI) and a lower level of physical activity. Also, more of the drivers in these groups had a high strain working environment.

The intervention group consisted of 31 male lorry drivers, nine male bus drivers, and 11 men with other occupations. Five of the subjects were retired due to sickness or age. The reference group consisted of 30 male lorry drivers, 15 male bus drivers, and six men with other occupations. Six of these subjects were retired. The mean (SD) age of the intervention group was 42.9 (9.9) years and of the reference group 43.4 (10.6) years. Eighty six per cent of the intervention group and 92% of the reference group were blue collar workers.

A comparison between the intervention group and the reference group according to the data from 1990<sup>8</sup> showed no significant differences in age, education, blood pressure, concentration of blood lipids, body mass index (BMI), level of physical activity in leisure time, smoking habits, and consumption of fat. Also, there were no differences between the groups for prevalence of a high strain working environment and the occurrence of shift work.

### ANALYSIS OF NON-RESPONDENTS

Forty one people in the intervention group participated in the three assessments (fig 1). Two people were unable to participate because of sickness and another two because of work. Five people did not wish to attend and one had died in a road accident. Age classification carried out at assessment 1 showed that most of the non-respondents (four people) were in the 55–64 year age group.

Forty seven people in the reference group participated in the three examinations (fig 1). One person could not participate because of sickness and three did not wish to attend. Age classification carried out at examination 1 showed that two non-respondents were in the 35–44 year age group and two were in the 55–64 year age group.

At the start of this investigation there were no significant differences between the two groups for important variables except for leisure time activities.

### QUESTIONNAIRES

#### Questionnaire 1

Questionnaire 1, used in the intervention group, consisted of a questionnaire worked out by Andersson<sup>12</sup> and Malmgren.<sup>13</sup> The questions asked about transport to work, leisure time activities, exercise habits, diet, tobacco use, perceived stress, and loneliness. The questions were based on the participant making self assessments on his awareness and conceptions associated with each question. All questions referred to the previous month. The subject had to mark his answer on a five point ordinal scale ranging from negative to positive alternatives. Only one of the five given alternatives could be chosen. The alternatives 1 and 2 were regarded as negative. From the answers a health profile was drawn. Questionnaire 1 was also used in the reference group but in a different design. No health profile was drawn from the answers in this group.

#### Questionnaire 2

Questionnaire 2, an interview, was made up of questions about support and obstacles when trying to change a health habit. This questionnaire was used only in the intervention group.

A contract on future health profile, worked out by Andersson<sup>12</sup> and Malmgren,<sup>13</sup> was used only in the intervention group. It was constructed by the subject in the way he wanted his health profile to look in the future. The subject also decided which change he wanted to start with and when he wanted to begin.

#### Questionnaire 3

Questionnaire 3 was used to evaluate the subjects' experiences of the programmes.

### MEASUREMENTS

Blood pressure was measured in mm Hg twice in a sitting position after 5 minutes of rest. The mean value of two measurements was calculated. Serum samples were obtained for the measurement of total cholesterol in mmol/l and high density lipoprotein in mmol/l after fasting for a minimum of 4 hours. Weight was

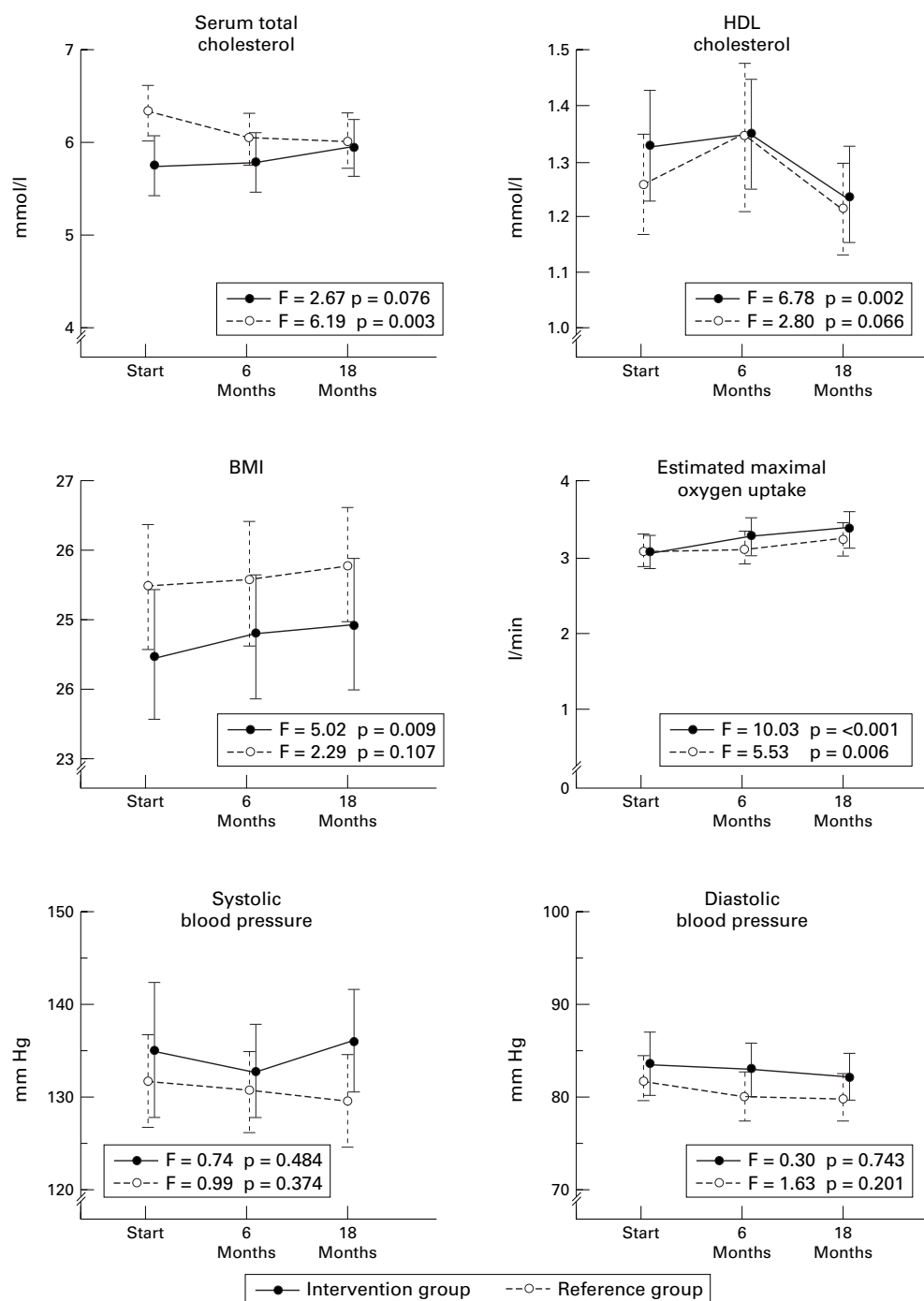


Figure 2 Mean (95% CIs) of the measured variables for the intervention and reference groups at the start and after 6 and 18 months. An ANOVA, adjusted for age, was used to test changes over time within each group.

measured in kg with a mechanical balance which was calibrated daily. During the weighing, the subjects wore only a shirt and shorts and no shoes; no corrections were made. Height was also measured without shoes. Body mass index was calculated as weight (kg)  $\times$  length<sup>-2</sup> (m). Submaximal exercise test was performed on an electrical braked bicycle ergometer.<sup>15</sup> Maximal oxygen uptake, expressed in l/min and ml/kg $\times$ min was calculated from heart rate and work load, correcting for age.<sup>18</sup>

#### PROGRAMME FOR THE INTERVENTION GROUP

(1) The health profile assessment<sup>12, 13</sup> began with a dialogue between the subject and a healthcare consultant answering questionnaire 1, about lifestyle, and this was followed by the measurements. In the final discussion the test results were linked to the different components of the assessment. Great importance was attached to the subject taking part in the logical discussion in which his own assessment of each component of his lifestyle was related to the different test values and to his own experience

of his social situation and stress. A logical decision based on the subject's own conviction to change behaviour was made and the assessment was often concluded with a written contract about the change. This encouraged the subject to make a comparison between current and desired health profiles. Initially the decision was only about one change. This change was described concretely and the reasons for it were given. The time for starting and for following up were specified. This made feedback possible to reinforce the new behaviour.

(2) After three months the subjects were contacted by phone by the healthcare consultant. At that occasion the contract about the future health profile was discussed, and if necessary, revised or completed. If changes had been made, these changes were noted.

(3) After 6 months a follow up assessment (assessment 2) was completed along with medical tests. On that occasion the contract for the future health profile was discussed, and when necessary revised or completed. A discussion about leisure time physical activity, balanced diet, stopping smoking, and coping with stress was carried out by the healthcare consultant. There was then a dialogue with a dietician, and written advice about eating habits.

(4) After 18 months a further assessment follow up (assessment 3) was completed with medical tests. A contract for the future profile and a dialogue about health habits was carried out. This follow up was completed with questionnaire 3 designed to evaluate the intervention programme.

#### ACTIVITIES

At the start and at the follow ups the subjects were offered brochures and information about physical activities, diet, stopping smoking, and coping with stress. Group and individual activities concerning leisure time physical activities, diet, stopping smoking, and coping with stress were offered to the subjects. All these activities were free of charge.

The intervention group and their families were invited to an information evening about exercise. The programme included both theory and practice and a visit to a recreation centre. The physical activities offered were both low intensity exercise—such as walking, jogging, and keep fit exercises—as well as more rigorous exercise. Examination by a physiotherapist for rehabilitation training was offered if necessary. The intervention group and their families were

also invited to an information session about nutrition and eating habits. They were offered a cookery course about food suitable for a lunch box. All these sessions were in the evening and conducted by experts.

#### PROGRAMME FOR THE REFERENCE GROUP

The examination (examination 1) consisted of answering questionnaire 1 and completing the measurements already mentioned. Afterwards the subjects were informed about some of the test results and were offered brochures on leisure time physical activity, diet, stopping smoking, and coping with stress.

With the intention of providing the reference group with the same attention as the intervention group, subjects were contacted by phone after three months.

After 6 months examination 2 was conducted.

After 18 months examination 3 was carried out. This follow up was completed with questionnaire 3 designed to evaluate the programme in the reference group.

#### STUDY DESIGN

Assessment 2 for the intervention group, and examination 2 for the referents took place in September 1992. Activities followed for the intervention group. In December 1992 both groups received a phone call. Activities followed for the intervention group. In March 1993 assessment 2 for the intervention group, and examination 2 for the referents took place. Activities followed for the intervention group. The third and final assessment in the intervention group and examination of the referents took place in March 1994.

#### *The differences between the two programmes*

In the reference group there was no revelatory communication with the intention of getting the individual driver to take responsibility for his health through positive health habits; no health profile; no written contract, and no activities.

#### THE ORGANISATION OF THE STUDY

The subjects in the intervention and reference groups were invited by letter to take part in the study. If the subject did not keep his first appointment he was given another letter or a phone call. A team, consisting of a healthcare consultant and a medical technician, performed the investigation in both groups. After

Table 1 Mean values of the estimates on the five point scale concerning the measured variables for the intervention and reference groups at the start and also after 6 and 18 months (ANOVA, adjusted for age and BMI, was used to test changes over time within and between groups)

| Variable                | Intervention group |          |           |      |         | Reference group |          |           |      |         | Comparison between intervention and reference groups |         |
|-------------------------|--------------------|----------|-----------|------|---------|-----------------|----------|-----------|------|---------|--|---------|
|                         | Start              | 6 months | 18 months | F    | p Value | Start           | 6 months | 18 months | F    | p Value | F  | p Value |
| Passive transportation  | 1.49               | 1.53     | 1.4       | 0.67 | 0.516   | 1.84            | 1.93     | 1.71      | 0.21 | 0.813   | 1.58   | 0.213   |
| Leisure time activities | 2.51               | 2.56     | 2.51      | 0.16 | 0.855   | 2.83            | 2.77     | 2.57      | 5.3  | 0.007   | 5.06   | 0.027   |
| Exercise habits         | 1.98               | 2.37     | 2.02      | 4.01 | 0.022   | 1.83            | 2        | 1.87      | 1.34 | 0.266   | 1.66   | 0.202   |
| Diet                    | 2.24               | 2.54     | 2.63      | 6.36 | 0.003   | 2.09            | 2.21     | 2.22      | 0.89 | 0.413   | 4.28   | 0.042   |
| Tobacco use             | 3.6                | 3.83     | 3.72      | 0.87 | 0.43    | 4               | 4.04     | 4.04      | 0    | 1       | 0.88   | 0.305   |
| Perceived stress        | 3.24               | 3.44     | 3.41      | 1.71 | 0.188   | 3.17            | 3.6      | 3.49      | 5.99 | 0.004   | 0.25   | 0.62    |
| Perceived loneliness    | 4.39               | 4.24     | 4.32      | 1.29 | 0.28    | 4.21            | 4.24     | 4.47      | 4.32 | 0.016   | 0.001  | 0.91    |

the measurements each subject was informed about the results of the tests and was given medical advice by a physician, if necessary.

#### DATA PROCESSING AND STATISTICS

The significance of the difference between the two groups at the start of the study was tested by *t* test. The 5% level was chosen as the critical level of significance. A 95% confidence interval (95% CI) was used in the description of the distribution of the measurement data.

Changes over time within and between the two groups were tested with an analysis of variance (ANOVA) repeated measurement model. In figure 1 age was used as the covariate, and in table 1 age and BMI were used as covariates (full factorial model with polynomial contrast).

The study was approved by the regional ethics research committee of the University of Umeå. The data processing procedures were approved by The National Computer Data Inspection Board.

## Results

#### ATTENDANCE AT ACTIVITIES ARRANGED WITHIN THE INTERVENTION PROGRAMME

All subjects attended the individual dialogues about exercise and diet. Eighteen subjects in the intervention group and six wives or cohabiting partners participated in the evening activities on exercise and diet.

#### TRENDS DURING THE PERIOD OF INTERVENTION

In the intervention group there was a significant increase of estimated oxygen uptake (l/min) and BMI and the concentration of high density lipoprotein cholesterol decreased during the intervention (fig 2). In the reference group the estimated oxygen uptake increased and the level of total cholesterol decreased significantly (fig 2).

In the intervention group there was a significant increase of the mean estimate on the five point scale for exercise habits and the eagerness to practice proper dietary habits during the intervention (table 1). In the reference group there was a significant decrease of the mean estimate of leisure time activities and a significant increase in perceived stress and loneliness during the same time (table 1).

#### DIFFERENCES BETWEEN THE INTERVENTION AND REFERENCE GROUPS

There were no significant differences between the intervention and reference groups for the measurements after correction for age.

A comparison between the two groups on health habits showed significant differences in leisure time activities and the eagerness to practice proper dietary habits when corrections for age and BMI were made (table 1).

#### FACTORS WHICH INFLUENCED THE CHANGE IN HEALTH HABITS IN THE INTERVENTION GROUP

An improved sense of wellbeing was the most important factor for those subjects who had succeeded in changing a health habit. Fifty eight per cent of the subjects at assessment 2 and 55% at assessment 3 found this.

Table 2 Total reported factors (n(%)) which were most important when the subject tried to change a health habit at the 2nd and 3rd assessment of the intervention group

| Factors                | Assessment 2 |    | Assessment 3 |    |
|------------------------|--------------|----|--------------|----|
|                        | n            | %  | n            | %  |
| Intervention programme | 5            | 13 | 7            | 16 |
| Family, friends        | 16           | 40 | 9            | 18 |
| Own conviction         | 7            | 18 | 11           | 25 |
| Improve the health     | 4            | 10 | 5            | 11 |
| Practical reasons      | 3            | 7  | 4            | 9  |
| Other reasons          | 5            | 13 | 9            | 20 |

Table 3 Total reported factors (n(%)) which were an obstacle when the subject tried to change a health habit at the 2nd and 3rd assessment of the intervention group

| Factors                    | Assessment 2 |    | Assessment 3 |    |
|----------------------------|--------------|----|--------------|----|
|                            | n            | %  | n            | %  |
| Lack of time               | 5            | 10 | 2            | 6  |
| Variable working hours     | 10           | 20 | 10           | 29 |
| Difficult to give up habit | 11           | 20 | 9            | 26 |
| Weather                    | 5            | 10 | 3            | 6  |
| Illness, injury            | 2            | 4  | 1            | 3  |
| Family, friends            | 8            | 16 | 6            | 18 |
| Other reasons              | 9            | 18 | 4            | 12 |

Forty per cent of the subjects at assessment 2 and 18% at assessment 3 thought that the family or friends were the most important support for changing a health habit (table 2). At assessment 2 18% thought that their own conviction was a support.

At assessment 2 20% of the subjects and at assessment 3 29% thought that the variable working hours were the main obstacle when trying to change a health habit (table 3). Many subjects also thought that it was difficult to give up an old habit and start with a new one.

#### SUBJECTS' EXPERIENCES OF THE PROGRAMMES

The evaluation of the subjects' experiences of the programmes showed that 90% of the intervention group and 81% of the reference group thought that the awareness of their health habits had been positively influenced by the programmes (not in table). Eighty six per cent of the intervention group and 57% of the reference group thought that the programme had led to positive changes of health habits. Eighty six per cent of the intervention group and 91% of the reference group responded positively to the prospect of another follow up within two years.

## Discussion

#### METHODOLOGICAL ASPECTS

##### *Representative nature of the study*

The subjects in the present study participated earlier 1990<sup>8</sup> in the evaluation of risk indicators of ischaemic heart disease. In that study the selection of subjects was based on a random distribution of male professional drivers from the Swedish counties of Västerbotten and Norrbotten. A comparison between subjects in the 1990 study and the present study showed no significant differences in most of the variables tested. Therefore the subjects in the present study represent professional drivers who had been members of the national unions for at least 3 years. However, during the period between 1990 and the start of the present study

some drivers had left their job as professional drivers but most still belonged to the same social class and had variable working hours or shift work.

#### *Distribution of the subjects in the intervention group and the reference group*

The ideal method for dividing subjects into study and reference groups is a random distribution.<sup>19</sup> In this investigation a quasi-experimental approach was used by selecting the subjects from two different towns to avoid a spillover effect between the two groups. With this design it is important to start with two equivalent groups. A comparison between the study and the reference group at the start of the investigation showed no significant differences in the variables of immediate importance for the present investigation.

#### *Non-responders*

The number of non-responders in the intervention group was 20% and in the reference group 8%. The analysis of the non-responders did not show any systematic tendency. Therefore there is no reason to think that non-responders have affected the results in any particular direction.

#### *Reliability and validity of assessment*

There are no figures on the reliability and validity of the assessment in printed form. However, the questionnaire is well standardised. No one can use it without theoretical and practical training for a week.<sup>12</sup> The method is also tested on many subjects.<sup>12, 15</sup>

#### *Comparison of bias of the test leader between assessment and examination*

In the present study assessment was used as a method of both intervention and evaluation. It was also the same personnel who conducted the intervention and the evaluation. The aim of assessment was to begin a process for the driver in which his current lifestyle was rationally evaluated. He was made aware of the theories behind the different health habits.<sup>13</sup> It was important for the administrator of the assessment to create a positive relation for an optimal intellectual exchange. This could lead to bias towards social desirability in that the answers because of bias towards the opinions of the leader. In the examination the contact between the healthcare consultant and the subject was not as intensive as in the assessment. These conditions ought to be taken into consideration when interpreting the differences between results in the study and the reference groups.

#### *Choice of intervention programme*

In this study many subjects had variable working hours which made attendance at regular group activities and common evening sessions difficult. Also, due to different working sites there was no common meeting place for normal activities. Consequently many subjects were without social support during the intervention period. Therefore it was important to find an intervention method in which the driver himself took responsibility for his health

through positive health habits adjusted to his needs. According to Granlund<sup>20</sup> an exercise and weight reduction programme must be tailored for each person to work in the long run.

#### EVALUATION OF THE TWO PROGRAMMES

##### *Contract and professional support*

Entering a contract was one part of the intervention programme. In our investigation many subjects with negative components in their health profile were willing to write a contract for changing their lifestyle. Behavioural contracts have been successfully used in some other programmes, the aims of which were to change health behaviour.<sup>21, 22</sup> This type of contract is a feasible and acceptable intervention tool to promote health activities because of the explicit goals it gives the subjects. The health habits that changed significantly in our study—exercise habits and eagerness to practice proper dietary habits—corresponded to the desired changes in the contracts at the follow ups after 6 and 18 months. According to Janz et al.<sup>21</sup> the best type of contract is a self contract or one in which the person administers his own reward and another person is available only for support and perhaps advice. This type of contract has been used in our investigation which also included professional support. There are different opinions about the effect of professional support. According to Hoff and Lowenstein<sup>23</sup> continuous interaction with health professionals can add to the motivation and reinforce health promoting activities. But an intervention study by Christensen<sup>24</sup> showed that professional support had no additional effect on the health behaviour. He found the same decrease in the incidence of risk factors for ischaemic heart disease in both the intervention and the reference group despite the fact that the reference group did not get any professional support. The conclusion of that study was that the change in the risk factors was mainly due to the Hawthorne effect and regression towards the mean.

##### *Changed health habits*

The increase in the mean value of estimated maximal oxygen uptake can be an effect of changed exercise habits. It was especially the subjects who initially had low maximal oxygen uptake that increased their values.

The intervention programme also affected the eagerness to practice proper dietary habits. However, the study did not show if the subjects had in fact changed their eating habits. But there are studies which show that diet seems to be easier to change than other behaviours related to cardiovascular diseases.<sup>25</sup>

The changed exercise habits and the increased eagerness to practice proper dietary habits did not improve the concentrations of blood lipids in the intervention group. Some possible explanations could be that the increase of physical exercise was not large enough or that the subjects at the start of the intervention had relatively normal serum lipid concentrations. Another reason could be that the intervention programme had no strict control on the eating and exercise habits of the

subjects. Studies<sup>26–29</sup> have shown that most adults can affect serum lipid values through a combined lifestyle modification consisting of low fat and low cholesterol diet and regular physical exercise. When the risk factors are only moderately increased, as for many subjects in our investigation, a high motivation is needed to change both eating and exercise habits. Furthermore the intervention programme was designed to change only one habit at a time. Maybe the results would have been different if the intervention group had consisted only of subjects of high risk. According to a study by Gibbins *et al*<sup>30</sup> an intervention programme for reducing cardiovascular risk in men was successful only in older patients and those people in whom a specific risk was identified. Another contributory cause could be that many subjects in our investigation worked shifts or had variable working hours which in turn can influence the nutrient supply and the level of stress and consequently also the concentration of cholesterol.

In the reference group there was a significant decrease of the mean value of total cholesterol during the study. This could partly be a consequence of the decrease in perceived stress at work and partly the decrease in the number of subjects with variable working hours in this group from the start to the 18 month follow up.

In our study there were no significant changes in tobacco use. Godin<sup>19</sup> reviewed 24 studies on the effectiveness of intervention to modify dieting, exercising, and smoking habits in people with coronary heart disease. The review showed that of seven studies that documented changes in smoking behaviour, four reported significant successful results. The successful studies had intervention programmes that focused exclusively on smoking habits. Studies with a less rigorous evaluation design tended to report positive results more often than those that adopted a more complex evaluation method. This fact was valid even for studies on exercise and dietary habits. That the intervention programme in our study was most successful for changes of exercise and eagerness to practice proper dietary habits could also be due to the fact that within these fields the intervention group and their families were invited to special activities.

#### *Factors which have influenced the possibilities of changing health habits*

In the intervention group the reported support during the process of establishing regular health habits consisted of two qualitatively different components. At the 6 month follow up family or friends were reported to be the most important support, and own conviction at the 18 months follow up. This progress from external to internal support seems to be important when a person is continually changing his health habits. According to a study by Wester-Wedman<sup>31</sup> a change of motives from external to internal is a prerequisite for continued activities.

In this study the main obstacles to changing health habits were variable working hours and the difficulty in giving up old habits. The sub-

jects who attempt to initiate and to sustain a change in lifestyle should be supported by changes in their work environment when needed. It is important that the health professionals pay attention to possible external obstacles and try to remove these or to reduce their effects. What is needed is a collaboration between the person, health professionals, and the personnel at the working site.

#### *The differences between assessment and examination to affect the risk factor pattern*

The main difference between assessment and examination was that assessment was based on revelatory communication to try to get the driver to take responsibility for his health through positive health habits, a health profile, a written contract, and individual and group activities. That the reference group also showed significant positive improvements in some variables could depend partly on the Hawthorne effect—that is, the group was shown attention in connection with the follow ups. On these occasions the subjects were offered brochures on physical activities, diet, stopping smoking, and coping with stress. The results of our study showed that examination with several follow ups has positive effects on some risk factors. As the examination was cheaper and easier to administer it is a viable alternative to assessment for the preventive occupational health service.

#### **Conclusions**

The results show that an intervention programme of the assessment type has an effect on the oxygen uptake and some health habits. Another result was that a health examination, which is cheaper and easier to administer, leads to improvements of some risk indicators and therefore can be an alternative to assessment. Both programmes turned out to be useful because of high participation during the entire period and a generally positive attitude among the subjects. One of the main obstacles to changing health habits was variable working hours which is often beyond the control of the subject. Therefore it is important that collaboration takes place between the person, health professionals, and the personnel at the working site when changing unhealthy behaviour.

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