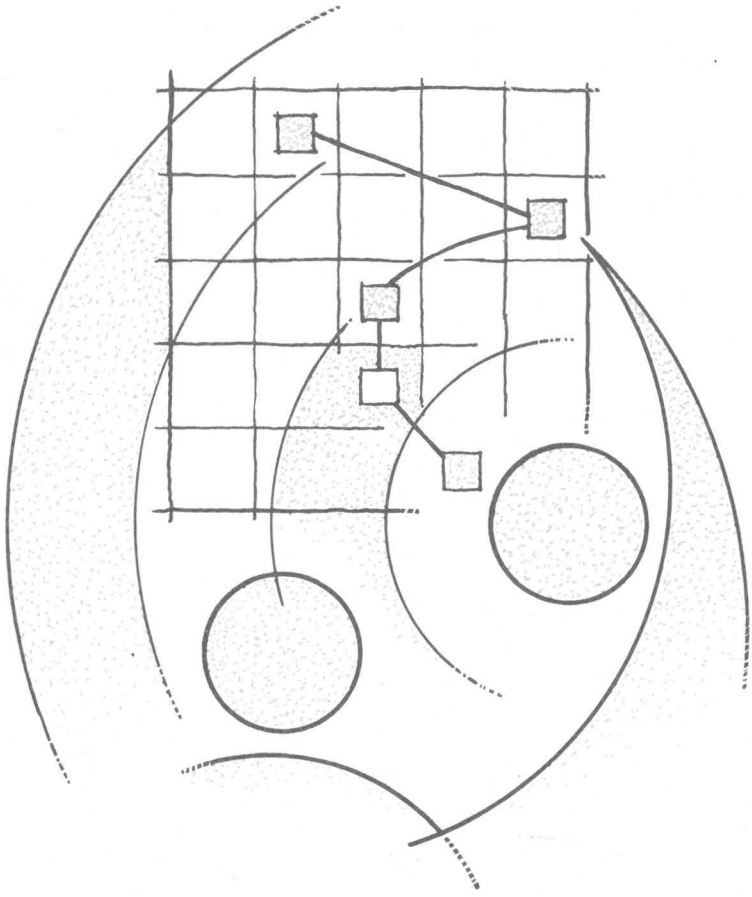
A HEALTH INFORMATION CAMPAIGN AND HEALTH PROFILE ASSESSMENT AS REVELATORY COMMUNICATION



BY STURE MALMGREN

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I. Andersson G, Malmgren S. Risk factors and reported sick leave among employees of Saab-Scania, Link—ping, Sweden, between the ages of 50 and 59. Scand J Soc Med 1986; 14: 25–30.

II. Malmgren S, Andersson G. Corporate reported sick leave and its relationship with education, responsibility and blood pressure. Scand J Soc Med 1984; 12: 171–176.

III. Malmgren S, Andersson G. Who were reached by and participated in a one year newspaper health information campaign? Scand J Soc Med 1986; 14: 133–140.

IV. Andersson G, Malmgren S, Ekstrand J. Occurrence of athletic injuries in voluntary participants in a 1-year extensive newspaper exercise campaign. Int J Sports Med 1986; 7: 222–225.

V. Malmgren S, Andersson G. Attitude and behaviour changes in connection with a 1-year newspaper health information campaign. Submitted for publication.

VI. Andersson G, Malmgren S. Health Profile Assessment as a screening instrument. Submitted for publication.

VII. Malmgren S, Andersson G. Health Profile Assessment as an instrument for revelatory communication. Submitted for publication.

The articles will be referred to by their Roman numerals.

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"First of all there is the unity in things whereby each thing is one with itself, is comprised of itself and is connected with itself. Secondly there is the unity whereby a creature is united with others and all parts of the world together constitute a world".

Pico della Mirandola, 1550 A.D.

CONTENTS

DEFINITIONS

Attitude	The amount of affect for or against some object.
Behavioural medicine	The interdisciplinary field concerned with the development and integration of behavioural and biomedical science.
Belief about an object	Perceived probable relationship between the object and some attribute.
Descriptive beliefs	Beliefs formed by direct experiences with a given object.
Exercise	Physical activity that is planned, structured, repetitive, and purposeful in the sense that improvement in or maintenance of one or more components of physical fitness is an objective.
External beliefs	Beliefs that do not correspond to any of the informational items provided.
Health promotion	General health measures directed toward those individuals who are still healthy. Primary prevention.
Inferential beliefs	Beliefs that go beyond directly observable events and can be based on prior descriptive beliefs but may also be formed on the basis of prior inferences.
Normative beliefs	Beliefs that certain referents think the person should or should not perform the behaviour in question.
Perceived general well-being	Self-reported, global affective experience rated on a positive-negative 5-point ordinal scale.
Perceived health	Self-reported health status.
Primary beliefs	The fundamental determinants of the dependent variable (attitude, norm) which is to be changed.
Prospective medicine	Seeks to show how the individual can establish a survival advantage by helping him to recognize the risks to his health and by suggesting how he can reduce these risks through various means.
Proximal beliefs	The individual's beliefs which correspond directly to informational items.
Revelatory communication	Communication which reveals obstacles to the individual, which exist in his own structure of rules, to changing his lifestyle and which initiates a restructuring process which leads to permanent changes in lifestyle.
Subjective norm	The totality of the normative pressures from the mutual adjustment of normative beliefs and the motivation to comply.

INTRODUCTION

Background

In recent decades more and more attention has been paid to the significance of human behaviour and the values and set of rules controlling it (Totman 1979). One part of this problem complex is the importance of positive health behaviour (Belloc et al 1972, Carlsson et al 1979, Tibbling et al 1986), which is part of a complex lifestyle that may reflect the ability to anticipate problems, mobilize to meet them and cope with them actively (Mechanic 1980). The research needed to elucidate these questions requires a cross-scientific approach. New concepts have arisen such as those comprised by behavioural medicine, which is defined as "the interdisciplinary field concerned with the development and integration of behavioural and biomedical science, knowledge and techniques relevant to health and illness and the application of this knowledge and these techniques to prevention, diagnosis, treatment and rehabilitation" (Schwartz et al 1978).

The industrial setting is an environment particularly well suited to preventive and remedial health programs, and the application of behavioural medicine at the work place has increased in recent years. Researchers and clinicians are becoming aware of the unique opportunities of the work site as a setting for basic research and intervention for environmentally related or modifiable health problems (Chesney et al 1979).

There is a new law in Sweden in regard to public health and medical care, whereby preventive public health work is accorded greater priority than before. During the past decade, several County Councils (Landsting) have approved special plans for health promotion. Health promotion in the form of information campaigns has for many years been quite extensive in Sweden, both in the mass media as well as elsewhere. The lack of selectivity and adaptability to the individual, however, often causes the short- term effects of such campaigns to be meagre in relationship to the effort expended (Klapper 1960).

Methods of communication are also needed which can be more readily adapted to the individual and which stimulate face-to-face communication (Bjurö et al 1975, Dishman 1981, Tones 1981, Henrysson et al 1982). Research concerning behaviour modification has also increased greatly in recent years and has generated a number of theories, methods and techniques (Kanfer et al 1980). It is essential that their application should not be limited to individual treatment of a clinical psychology character, but rather that their practical application should also be tested using scientific assessment so that they can attain widespread use within the area of health promotion (Rönnberg 1982).

We have developed and clinically tested a special method within the area of revelatory communication the purpose of which is to get the individual himself to take responsibility for his health via positive health habits. This method, which we have designated as "Hälsoprofilbedömning", HPB, (Health Profile Assessment), has been developed within the evolvement of a comprehensive preventive health care program at Saab-Scania in Linköping (ca 6 000 employees).

The HPB arises from the philosophy of prospective medicine (Laszlo et al 1981), from which other similar methods have been developed such as the Health Hazard Appraisal (Vogt 1981) and the Nottingham Health Profile (Hunt et al 1980,1981). In contrast to the other methods, the HPB places more emphasis on the importance of a two- way communication process.

Theory

A biopsychosocial model which originates from "general systems theory"

The theoretical basis for this dissertation is a theory of central importance within Behavioural medicine (Schwartz 1982). "It is a biopsychosocial model that provides a blueprint for research, a framework for teaching, and a design for action in the real world of health care" (Engel 1977). Its basis lies in structuralism and holism. According to structuralism it is possible to construct a picture or model of what lies behind the things an individual does and says in his ordinary day to day existence. An individual's behaviour is seen as the product of an underlying structure of rules (Totman 1979). The concept of holism was introduced in order to describe "the fundamental factor operative towards the creation of wholes in the universe" (Smuts 1926). A whole is more than the sum of its component parts.

The theory model which has the potential to provide a unifying, metatheoretical framework for integrating biological, psychological, and social approaches to health and illness (Schwartz 1982) originates from "general systems theory" (Bertalanffy 1973, Engel 1977, Schwartz 1982, Chotai et al 1985). According to this theory, reality consists of hierarchical structures with different levels in which the complexity increases the higher up one goes. Each level consists of a number of units, or systems, which interact with each other. In turn, each of these systems consists of subunits at a lower level, with less complexity, which interact with one another. Each hierachical subsystem is autonomous but is influenced by and influences other systems by means of feedback mechanisms. This means that when a system is disturbed, the system which is functionally nearest to it is affected first, but gradually other systems on other levels are also affected. Stability in the hierachy exists when there is harmony within and between systems.

Some of man's subordinate and higher hierarchies

If we start from man as an individual and a system and go downward in the hierarchies, the man system consists of a number of subunits, or organ systems, which interact to provide good total function in the man system. Each organ consists in turn of a very large number of cells which must work together in a very disciplined way in order to provide good organ function.

If we continue upward in the hierachies from the man system we can, for example, choose the family as the first social system, and then the people one

works with, and then the nation.

A holon posesses a substantial degree of autonomy

Special concepts have been introduced and defined, such as the concept "holon", in order to describe the conditions which are in force in the interplay within and between the different units of the system (Koestler 1967, 1978, Koestler et al 1969). A holon is a stable, integrated structure which is equipped with self-regulating facilities and which possesses a substantial degree of autonomy. Irrespective of whether we are talking about cells, individuals or communities, they all have their own patterns of activity which occur spontaneously without external stimulation. At the same time as they themselves are parts of and subordinate higher hierarchies, they in turn consist of holons in lower hierarchies. This is an exeptionally important assertion. It makes it clear that in its existence every holon has to balance two opposing tendencies. That is to say both an integrative tendency to function as a part in the larger unit — the dynamic expression for complicity — as well as a self-assertive tendency to preserve its own individual autonomy — the dynamic expression for wholeness (Koestler 1978).

Man must balance the integrative and self-assertive tendencies

If we apply this reasoning to the individual person, it means that he must balance the demands — which are placed on him as a part in a social system with successively higher levels — against the demands, which are placed on him as an independently functioning individual with biological responsibility for the subordinate hierarchies of organs, cells, and so on. Thus the individual must follow the set of rules or codes (Koestler 1978) which govern every hierarchy and which provide stability and structure to the holons which make them up (Fig. 1).

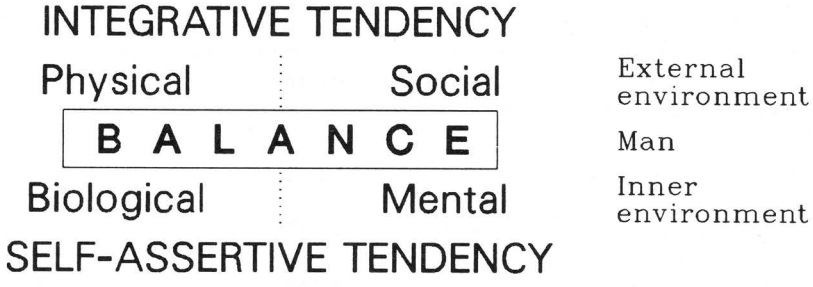


Figure 1. *Model of man's two balanced tendencies.*

Social activity corresponds to the integrative tendency, and the needs for social contact and the sense of belonging to a group are so important to species

survival that their absence produces distress and dysfunction (Kaplan et al 1977, Broadhead et al 1983). Research strongly supports the importance of man's social integration in regard to resistance to illness (Chesney et al 1982, Gottlieb et al 1984). Social support is more than simple environmental exposure. It can also be studied as a direct determinant of health or illness (Broadhead et al 1983).

Sound health habits correspond to the self-assertive tendency

The individual's responsibility for his own subordinate hierarchies is positioned against the requirement for participation in social hierarchies. Cells and organ systems require stimulation in the form of physical activity (Belloc et al 1972, Morris 1973, Andersen et al 1978, Fentem et al 1981, Strömme et al 1982), nutritious diet (Belloc et al 1972, Hjermann et al 1981) and the absence of drugs and other poisons for survival and good function. Time for rest and recreation is required in order to regain one's strength and build oneself up again both psychologically as well as physically. In other words, in his lifestyle the individual must consciously give priority to himself and his health. Sound health habits consequently correspond to the self-assertive tendency while the integrative tendency corresponds to the need for social contact and activity.

Feedback processes test behaviour against rule systems

The systems of rules, or codes, which are developed within the person thus must give the person the ability to balance the two tendencies — the integrative and the self-assertive. Each behaviour gives the individual feedback for comparison with his own system of rules. If the action in question is not in accord with the rules system and therefore does not get immediate approval, cognitive consistency is consequently not present and an inner process of comparison with continued feedback is repeated until there is consistancy (Totman 1979). Rules are tested in this way not only in actual behaviour but also in the exchange of opinions in conversation with others.

As is evident from the theory model, however, an individual's behaviour is not solely the product of his own rules, but is also the result of tendencies and limitations. Every action a person performs can therefore be assumed to be the result both of rules applied in response to social cues and limitations imposed by the physical environment, and of the biological and psychological characteristics of the subject himself (Totman 1979) (Fig. 1)

Deficient person-environment-fit causes stress

In order to attain a person-environment fit (PE fit) it is thus necessary that the individual's rules system is able to balance both opposing tendencies (Caplan 1983) — the self-assertive tendency which involves adjustment between the individual's needs and the resources of the external environment, and the integrative tendency which involves adjustment between the demands of the environment

on the individual and his ability to fulfill them. Adjustment can occur objectively (coping) by means of environment mastery, when the individual masters the environment or makes changes in himself. Subjective adjustment means that by means of defence mechanisms the individual brings about dissortion of something in his perception of reality or in his perception of his own abilities (Caplan 1983). Inadequate adjustment with difficulties in balancing both tendencies and attaining cognitive consistency subjects the individual to stress (Koestler 1978).

Generative rules create a lot of behaviour strategies

The range of actions it is possible to envisage is virtually infinite. Therefore, social behaviour must be represented as the product of generative rules or rules capable of generating a virtually infinite range of actions (Totman 1979). One rule can create many different behaviour strategies. The best single predictor of an individual's behaviour is his "intention" to perform that behaviour (Fishbein 1975).

Attitude and subjective norm as generative rules

Three major facts influence the magnitude of the relationship between intention and behaviour: the degree to which intention and behaviour correspond in their levels of specificity, stability of the intention, and the degree to which carrying out the intention is completely under the person's volitional control. Performance of a behaviour may depend on other people or on the occurrence of certain events. Therefore a person may be unable to carry out his intention (Fishbein 1975).

An intention is a function of both attitude and subjective norm

The complex intrapersonal processes in an individual which generate a specific intention to carry out a specific action are elucidated in a modified theoretical framework of Ajzen/Fishbein (Fig. 2). According to this it is clear that a person's behavioural intention is viewed as a function of two factors, his attitude toward the behaviour and his subjective norm. Each of these is viewed as a general predisposition that does not predispose the person to perform any specific behaviour (Fishbein 1975). In this model, attitude and subjective norm can consequently be said to correspond to the "generative rules" which were described earlier. To simplify somewhat, the subjective norm can be seen as the part of the rules system which correspond to the integrative tendency when it is generated by normative beliefs about whether important others think the person should or should not perform the behaviour in question. An attitude is genererated by beliefs about what the consequences of a specific behaviour will be for the individual himself, and thus corresponds most closely to the rules system of the self-assertive tendency.

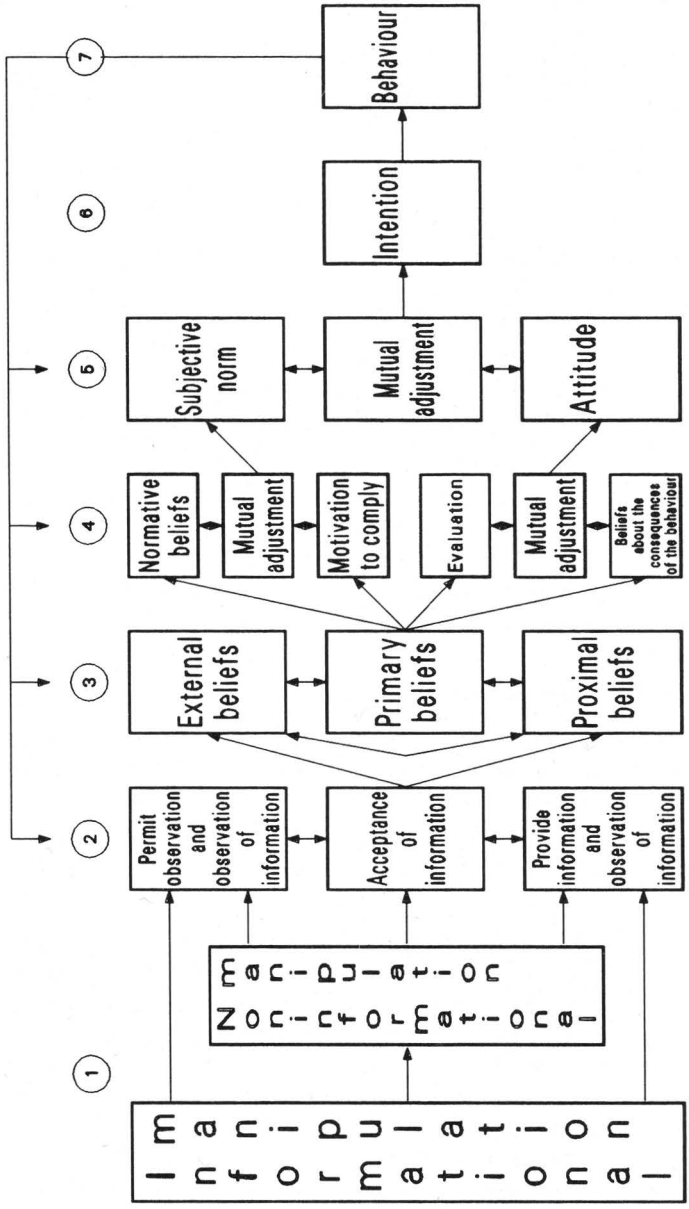


Figure 2. *Processes intervening between presentation of information and behaviour change, modified after Ajzen/Fishbein.*

It is essential to distinguish between belief, attitude, subjective norm, intention and behaviour

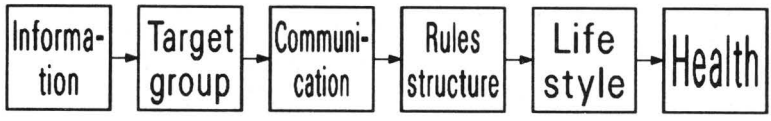
In this model it is essential to distinguish between belief, attitude, subjective norm, intention and behaviour (Fig. 2). The primary beliefs in the form of normative beliefs and beliefs concerning the consequences of behaviour serve as the fundamental determinants of the subjective norm and the attitude. These are the determinants of the intention, which in turn are the determinants of the behaviour. An influence attempt may fail to affect change in behaviour even if the information has been accepted, because it does not produce the desired effects on proximal or external beliefs, so that primary beliefs are in turn modified so that the process can continue. The subjective norm concerning a behaviour is based on the entire set of primary normative beliefs.

A person's attitude towards a behaviour is based on the the entire set of primary beliefs inferring that performing the behaviour will lead to certain consequences, but also on his evaluation of these concequences. To bring about a desired attitude change a preceding evaluation process is thus needed. Correspondingly, a change in the subjective norm demands a prior process in which the motivation to comply is determinant. If the desired intention towards a particular change in behaviour is to be created, a further evaluation process involving adjustment of the subjective norm and the attitude is required. The relative value of each of these determinants varies as a function of the variable for individual differences and the behaviour in question.

The scope of the dissertation

The basic question asked in this dissertation is "Can information about health produce desirable changes in lifestyle?" and in elucidation of what a desirable change in lifestyle is, also involves the question "Is there any connection between lifestyle and health?".

According to the model below, the primary question at issue involves a series of subquestions.



What it is that constitutes a desirable change in lifestyle is discussed in light of the relationship between rules structure - lifestyle — health. In analysing the possibility of reaching the right target group with information by means of communication which results in a change in lifestyle via a change in one's rules structure, the new concept "Revelatory communication" is being introduced.

AIMS OF THE DISSERTATION

To study:

— Lifestyle and health (papers II, IV, VI, VII).

— Who were reached by and participated in a mass media health information campaign (paper III, IV).

— Attitude and behaviour changes in connection with the campaign (paper V).

— The intrapersonal process which generates permanent changes in lifestyle (paper V, VII).

— "Hälsoprofilbedömning", HPB (Health Profile Assessment) as revelatory communication (paper VII).

— Which target groups are most important and which are most difficult to reach (papers I, III, IV, VII).

— HPB as an instrument for screening important target groups (paper VI).

MATERIALS AND METHODS

This study is based on the following five materials:

- All employees of Saab-Scania, Linköping, in the age group 50–59 years (papers I, II).
- A total population study of persistent participants in a 1-year newspaper health information campaign in Linköping (papers III, IV, V).
- A random sample of the population of the city of Linköping (papers III, V).
- Employees at Saab-Scania, Linköping in the age group 40 years (paper VI).
- A random sample of employees at Saab-Scania, Linköping (paper VII).

A study of all employees at Saab-Scania, Linköping, in the age group 50–59 years (papers I, II)

The study group included all 1 313 employees of Saab Aircraft Division, Saab-Scania, Linköping, in the age group 50–59 years. The entire study group is presented in Table I.

In 1975 everyone in the study group was called during their working hours to the company's Physical Fitness Centre to be interviewed, weighed, measured and have several other physical measurements taken. The interview covered physical exertion at work, mode of travelling to work, smoking habits, physical exercise before age 20 and current exercise habits. The measurements taken included systolic blood pressure, height, weight and skeletal diameters of the wrists (radio-ulnar) and the knees (at the condyle level of the femur) (von Döbeln 1959). The blood pressure was taken after about 10 minutes in a sitting position. A submaximal work test was performed on a mechanically braked bicycle ergometer (Åstrand 1977). A nomogram was used to estimate maximal aerobic power from the working pulse and the load, corrected for age (Åstrand 1960). The physical conditioning index was calculated using skeletal weight and working pulse (von Döbeln 1965,1966).

Table I. *All employees of Saab Aircraft Division, Saab-Scania, Linköping, Sweden, in the age group 50–59 years.*

	Men		Women		Total	
Workers	512	(94%)	33	(6%)	545	(42%)
Salaried employees	691	(90%)	77	(10%)	768	(58%)
Total	1 203	(91%)	110	(9%)	1 313	(100%)

Information was also obtained from personnel records about sex, age and type of employment. For the workers the number of days reported sick in 1974 and 1975 was included. For the salaried employees the number of days reported sick between 1970 and 1975, as well as the educational level (low=elementary school, medium= secondary school, high=university) and level of responsibility at work were taken into consideration. When rating the level of responsibility, the two main criteria used were work function and degree of difficulty (SAF 1975). A worker's sick leave included only the number of working days on which he/she reported being sick (max 269 days/year). Salaried employees had a maximum of 334 days, including all the days of the year except holidays.

In order to gain some idea as to the systematic error caused by earlier dropouts due to death, early retirement and disability retirement, a retrospective comparison was undertaken between salaried employees and workers between the ages of 50–59 for the years 1964–1975. This comparison showed that more workers (5%) than salaried employees (3%) had died, and that a considerably greater number of individuals had been awarded disability pension or had gone into early retirement among the workers (5%) than among the salaried employees (1%) ($p<0.01$). Those in the investigation group who failed to appear at the Physical Fitness Centre, despite personal contact, are categorized in Table II.

Table II. *Dropouts — reasons for not participating.*

	Workers		Salaried employees		Total
	Men	Women	Men	Women	
Declined because of physical handicap	53	2	30	3	88
Declined for other reasons	62	2	35	4	103
Reported sick	24	0	20	2	46
Deceased	0	0	1	0	1
Total dropouts	139	4	86	9	238
Percent dropouts	27%	12%	12%	12%	18.1%

The design of a total population study of persistant participants in a 1-year newspaper health information campaign in Linköping (papers III, IV, V)

In 1977–1978 the newspaper Östgötacorrespondenten (Corren) ran a 1-year campaign for better health in Linköping and Motala (Malmgren et al 1981). The campaign was called "Piggare med Corren" (Get fit with the Corren) and included exercise, dietary and antismoking components. It was given a great deal of publicity in the newspaper with special supplements every week. Approximately ten informative meetings were arranged in Linköping with specialists from the University Hospital, the Saab-Scania Physical Fitness Centre and Linköping University, and readers' questions were answered in the newspaper.

Cooperation was established with the local indoor and outdoor sports organizations which resulted in the formation of about twenty new exercise groups in Linköping. Company teams were formed and competitions were held between different places of work. There has probably never been a more intensive newspaper campaign in Sweden to increase people's awareness of their health.

The campaign started in April 1977 and ended in March 1978. Participants in the campaign registered voluntarily. Information on the participants was collected from registration forms, monthly reports, fitness tests and questionnaires. 2 887 persons registered for the campaign. The mean age of the registered participants was 40.4 years. 67% were women and 33% men. During the campaign the registrants sent monthly reports to the newspaper with information about their exercise, weight and smoking changes. 1 622 (56%) of the 2 887 persons who registered for the campaign sent in monthly reports at least once. 199 (7%) sent in all monthly reports. 1 212 of the 2 887 registrants expressed an interest in participating in a fitness test at the Saab-Scania Physical Fitness Centre in Linköping. All 1 212 were called, with 844 persons (70%) participating in the first test which took place between March and May, 1977. These 844 persons were called again one year later for follow-up. 255 persons participated in the second test in April 1978. The fitness test included interviews, measurements and a submaximal work test on the bicycle ergometer. The interview covered exercise and smoking habits. The measurements taken included systolic blood pressure, height, weight and the same anthropometric measurements as described earlier (von Döbeln 1959).

After the campaign a questionnaire was sent out in April 1978 to (Fig. 3):

A. All participants who had taken part in the first fitness test (844 persons).

B. All participants who had taken part in the "quit smoking" part of the campaign (418 persons).

C. All participants who had sent at least ten monthly reports to the newspaper (433 persons).

D. All participants who had sent in one or more of the last 3 monthly reports and who did not fit into one of the other categories (220 persons).

Of 1 568 participants who received the questionnaire, 935 persons (60%) returned it. The lowest response rate was among the participants in group B (39%), and the highest was in groups C (84%) and D (70%), i.e., those who sent in most of their monthly reports. The combination of categories containing the greatest number of persons who answered the questionnaire was comprised of those who took part in the first fitness test and who sent in 10–12 monthly reports.

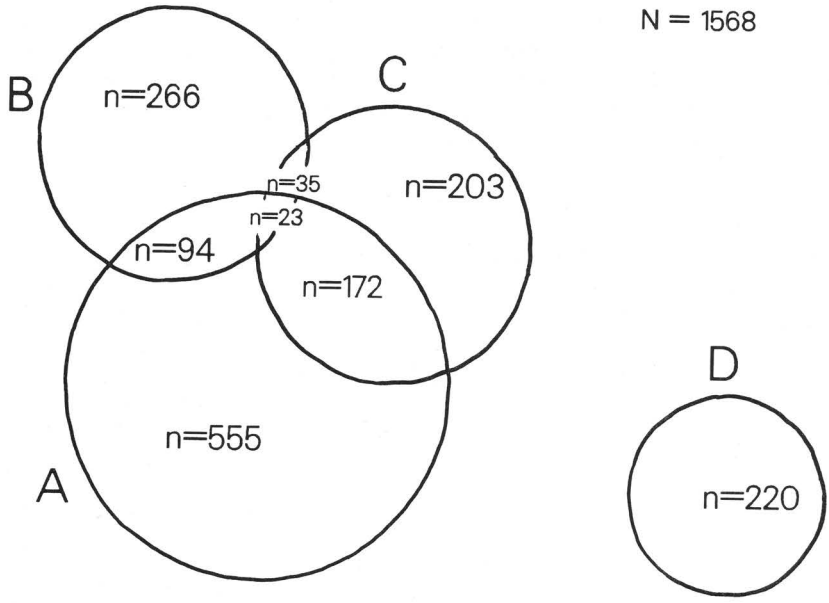


Figure 3. *Target group for questionnaire to registrants in the campaign (A) who participated in the fitness test (n=844), (B) who participated in the "quit smoking" part of the campaign (n=418), (C) who sent in 10–12 monthly reports (n=433), (D) who sent in at least one of the last three monthly reports and who do not fit into categories A, B, or C.*

The questions in the questionnaire pertained to exercise habits before the campaign and number of different exercise activities before and during the campaign. There were also questions about exercise injuries which had posed an obstacle to continued exercise and had also resulted in calls to a doctor and sick leave. The questionnaire included questions about diseases before the campaign, perceived symptoms before and after the campaign, and experiences of feeling more or less healthy/ill in connection with the campaign.

A study of a random sample of the city of Linköping (papers III, V)

The sampling was carried out by the County Administration Data Section. The population is defined as inhabitants of the city of Linköping over the age of 17 years. There are 65 735 persons in the population and a random sample

of 248 persons was used for this study (Fig. 4). A questionnaire was sent to this sample one year after the campaign ended. Of the 248 questionnaires sent out, 204 (82%) were returned or answered by telephone. The returned questionnaires were representative for the age distribution of the population, but men were slightly underrepresented. Of the 44 persons who did not return the questionnaire, 35 could not be reached,6 refused to answer, 2 were sick and 1 was deceased.

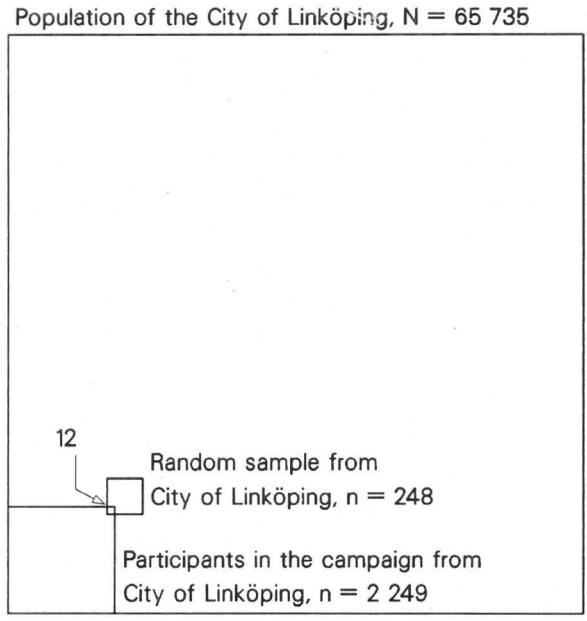


Figure 4. *The population, the registrants in the campaign and the random sample from the city of Linköping.*

The questions asked in the questionnaire were in reference to awareness of the "Piggare med Corren" campaign, exercise, dietary and smoking habits after the campaign, and attitudes toward exercise, diet and smoking after the campaign.

The percentages obtained in the random sample can be generalized to the population of the city of Linköping with a 95% confidence interval so that these lie within the following limits:

Percentage in the random sample	Percentage interval in the population
10%	6.5–15%
20%	15–26%
30%	24–36.5%
40%	33.5–47%
50%	43–57%
60%	53–66.5%
70%	63–76%
80%	74–85%
90%	85–93%

Health Profile Assessment, HPB, and the employees at Saab-Scania, Linköping, in the 40 year old age group (paper VI)

Since 1982 "Hälsoprofilbedömning", HPB, (Health Profile Assessment) has been carried out on employees at Saab-Scania in Linköping when they become 40 years old. The HPB has replaced the general medical check-up carried out on company employees in this age group. In 1982 there were 50 workers and 112 salaried employees who were 40 years old. 38 persons (23%) declined participation in the HPB. Of the 124 participating 40-year-olds, 10 (8%) were women.

The HPB comprises three components: self assessment of important health habits, self assessment of some health experiences, and some medical and physiological measurements. The HPB is begun with a conversation based on a questionnaire, which is followed by measurements of blood pressure, anthropometric measurements, and a submaximal work test on the bicycle ergometer, and it is completed with a discussion. The dialogue is begun with questions about physical activity prior to the age of 20 years and the person's current job situation.

The questionnaire consists of eleven questions on a 5-point ordinal scale the answers to which shed light on some important health habits and what the participant considers his state of health to be. Only one of the five given response alternatives can be chosen. The questions are based on having the participant make a self assessment which reflects his awareness and beliefs that are associated with the respective questions.

All questions refer to the past month and the first five questions in the questionnaire concern: *mode of transportation to work, leisure-time activities, exercise* (in sweat suit or appropriate training clothes for the purpose of maintaining or improving one's physical condition or health), *diet*, and *tobacco use*. The person conducting the dialogue and test transfers the answers from the questionnaire to a new form and by means of supplementary questions tries to help the person undergoing the HPB to determine whether he has correctly un-

derstood the questions and answered them accurately. He then has a chance to revise his assessment. The next two questions concern *alcohol intake* and *drug consumption* (tranquilizers, sedatives, or drugs for sleep and/or pain relief).

The final questions concern the individual's perception of psychosomatic *symptoms, stress, loneliness* and *health.*

The measurements are begun with systolic and diastolic blood pressure. Overweight and underweight are assessed by the same anthropometric measurements as described earlier (von Döbeln 1959). The measurements are followed by a submaximal work test on the bicycle ergometer during which the individual also makes an assessment as to how strenous he thinks the test is based on the so-called RPE-scale, 6–20 (Borg 1970, 1982).

A study of a random sample of employees at Saab-Scania, Linköping (paper VII)

A study was done in 1983 at Saab-Scania in Linköping. It comprised 610 employees randomly selected from a total of 6 241 employees. 59% of the subjects were salaried white-collar employees and 41% were blue-collar workers. 18% were women.

A comprehensive questionnaire was sent to the selected group in the Spring of 1983 and after two reminders the response rate was 85.3%. The questions asked in the questionnaire referred to health habits and leisure time activities, among other things. The questionnaire also included questions about utilization of the company's preventive health care and recreational resources and possible changes in exercise habits and the reasons for these changes.

STATISTICAL METHODS

The information was computer processed (papers I–V, VII). The material was processed with standard statistical packages SPSS (papers I–V, VII), and OSIRIS (paper I). The statistical methods used were AID analysis (paper I), paired t-tests (papers I–III), Fisher's exact test (paper III) and the chi-square test (papers II–VI).

AID-analysis is a "stepwise analysis" in which the material to be analysed is successively divided into two mutually exclusive parts in such a way that they differ as significantly as possible from each other with respect to the dependent variable. After the first division, the two groups obtained are divided, and these groups are in turn divided into two groups, still with respect to those predictors giving the strongest possible contrast regarding the dependent variable.

RESULTS

Risk factors and reported sick leave among employees of Saab-Scania between the ages of 50 and 59 years (paper I)

Groups with high vs. low rates of sick leave

AID-analysis was used to analyse the number of sick leave days in 1974–1975 for the workers and the number of sick leave days for the salaried employees in 1970–1975. As predictors we used sex, age, blood pressure, physical conditioning index, smoking, exercise, weight, estimated maximal aerobic power, overweight, participation in the interview/measurements and the completion of the work test. Educational level and level of responsibility were also used as predictors for the salaried employees.

With regard to days absent for the workers, further breakdown into smaller groups as unlike each other as possible could only be done via the predictor "participant in interview/measurements". Those who had not participated in the interview and measurements were defined as the group with the highest rate of absenteeism, a mean of 82 days as compared with a mean of 27 days absent for the participants. The other predictors were not strong enough to warrant further subdivision.

Of the 759 salaried employees, 166 did not participate at all in the investigation, or else they only participated in the interview, during which they said that they did not exercise. These formed a high-risk group whose mean absence was almost three times that of the others.

Corporate reported sick leave and its relationship with education, responsibility and blood pressure (paper II)

Among the workers, high blood pressure was not related to absenteeism, but the salaried employees with high blood pressure appeared to have a lower rate of absenteeism. This relationship in the salaried group was analysed further and blood pressure was compared for groups with different levels of education and responsibility (Fig. 5).

The only combination which showed a lower than average number of sick days with a higher than average blood pressure was low level of education and medium level of responsibility. A similar tendency was found in the combination medium level of education and high level of responsibility.

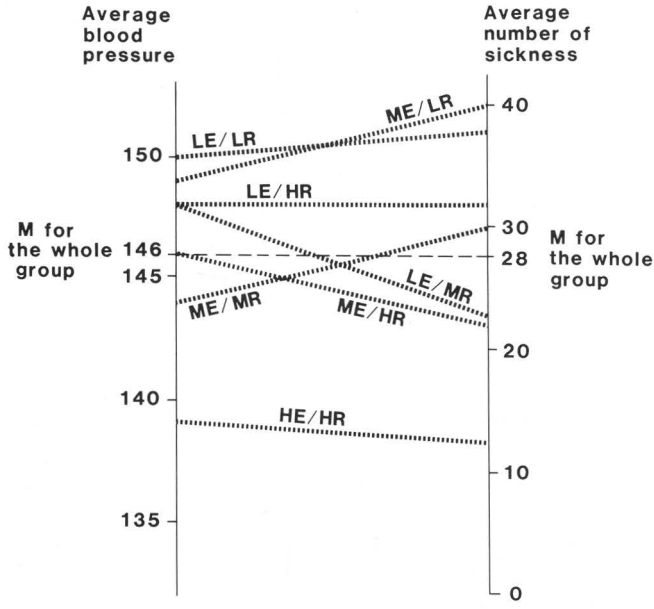


Figure 5. *Comparison of the intervariation of blood pressure with different combinations of educational level and level of responsibility, with absence due to illness values for these combinations; salaried employees. Educational level: LE=low. ME=medium, HE=high. Level of responsibility: LR=low, MR=medium, HR=high.*

Who were reached by and participated in a one year newspaper health information campaign? (paper III)

Analysis of questionnaire response, dropout and participation of the registrants in the campaign

Slightly more than half of the registrants who did not answer the questionnaire (52%) participated in the first fitness test. This makes it possible to study the non-response and dropout problems by analysing the results from both the tests. A model of this analysis is presented in Fig. 6. In the following comparisons, questionnaire response (comparisons 1, 2 and 3), dropout (comparison 4) and participation (comparison 5) are studied.

	Analysis of results from fitness **test one**		Analysis of results from fitness **test two** in group participating in both tests
	Participated **only** in **test one**	Participated in **both** test one and test two	
Answered the questionnaire	A n=303	B n=214	E n=214
Did not answer questionnaire	C n=286	D n=41	F n=41
	N=844		

Figure 6. *Model for analysis of the results of the fitness tests.*

1. In comparing A + B to C + D, differences in starting values in fitness test one for those who answered and those who did not answer the questionnaire can be seen. The comparison shows that the group that did not answer the questionnaire contains more non-exercisers ($p<0.01$) and more smokers ($p<0.01$), compared with those who answered the questionnaire.

2. In the comparison between B and D, the initial values in fitness test one are analysed for those who were motivated enough to come back for the second test. Even in this motivated group we find that the group that did not answer the questionnaire contained more smokers ($p<0.05$) and a tendency (not significant) toward more non- exercisers, as compared with those who answered the questionnaire.

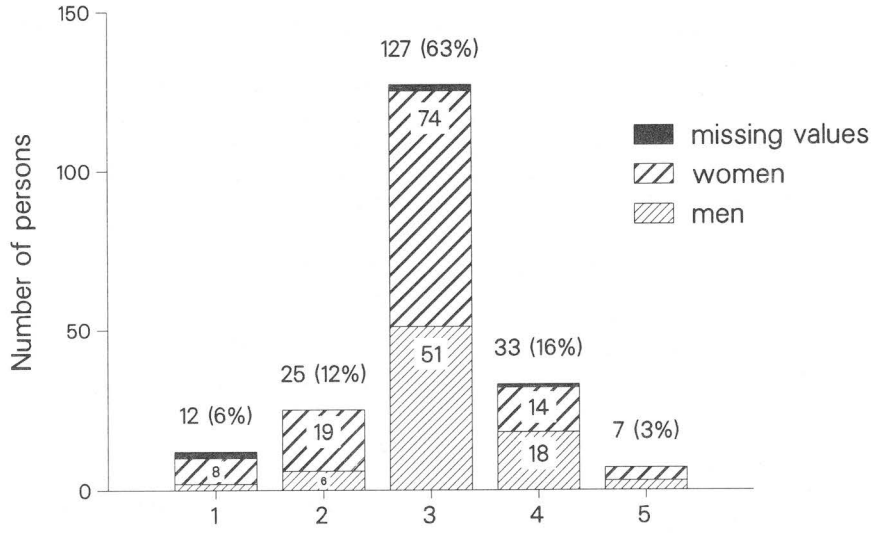
3. The changes from B to E are compared with the changes from D to F. This analysis shows whether there is any difference from test one to test two between the groups which had answered and those which had not answered the questionnaire. The results show that very few of the persons who returned for the second test did not answer the questionnaire, and also that both groups had positive changes with regard to exercise and smoking habits. Non-exercisers decreased from 19% to 4% and smokers from 19% to 10% in the group answering the questionnaire. The corresponding figures for those who did not answer the questionnaire are 27% to 17% for non-exercisers and 34% to 22% for smokers. The differences in improvement in these two groups, however, are not significant. When these groups are compared, we also find a significant decrease in weight ($p<0.01$) and a significant increase in estimated maximal aerobic power ($p<0.05$) in the group that answered the questionnaire, whereas no improvements were found among those who did not answer the questionnaire.

4. A comparison is made between those who came for just the first test (A + C) and those who came for both tests (B + D), and this illustrates the problem of dropout. When the starting points in fitness test one are compared for these two groups, we can see that the group which did not come back a second time contained more non- exercisers ($p<0.01$) and more smokers ($p<0.05$), and that the mean age was lower ($p<0.01$) compared with those who came for both tests (B + D). The estimated maximal aerobic power was also significantly higher in B + D compared with A + C ($p<0.05$).

5. The comparison between B and C illustrates the difference in the starting values in fitness test one for those who participated the most (group B) and the least (group C), respectively, with the regard to both tests and questionnaires. The analysis shows that the group which participated least (group C) consisted of more non-exercisers ($p<0.01$) and smokers ($p<0.001$) compared with group B. The average age was also lower ($p<0.01$) in group C compared with group B.

Who were reached by the campaign according to the random sample from the city of Linköping

Six percent of the sample reported that they participated in and followed the campaign regularly. There are no significant differences between the sexes, in spite of the fact that women said that they paid more attention to the campaign than the men. Clearly, awareness of the campaign in the city was high, as only 3% said they had not heard of it and the majority had read about it (Fig. 7).



1. Participated in the campaign and followed it regularly.
2. Never participated in the campaign but followed it regularly.
3. Knew about the campaign and read about it now and then.
4. Knew about the campaign but never read anything about it.
5. Never heard of the campaign.

Figure 7. *Awareness and participation in the campaign in the sample.*

Occurrence of exercise injuries in voluntary participants in a 1-year extensive newspaper exercise campaign (paper IV)

Exercise habits

Only 50 persons (5%) said that they did not exercise before the campaign, 44% exercised at least 1–2 times a week, and the rest exercised occasionally. In this respect there was no difference between men and women, but there was a difference regarding change of exercise habits, which was indicative of whether or not the exercisers had begun new and different exercise activities. 43% of the women and 35% of the men ($p<0.05$) participated in a greater number of different exercise activities during the campaign than before it. 6% of the women and 8% of the men participated in fewer different exercise activities.

Exercise injuries — exercise habits

15% of the individuals in the group which exercised 3–5 times a week before the campaign were injured as compared with 6.5–8% of those who did not exercise before the campaign ($p<0.05$).

The mean number of different exercise activities/participant before the campaign was 2.5 for the injured persons and 2.0 for the others ($p<0.01$). The increase in the mean number of activities/participant was not significantly greater for the injured individuals: 0.6 compared with 0.5 activities for the noninjured participants.

Attitude and behaviour change in connection with a 1-year newspaper health information campaign (paper V)

Random sample — changes of attitudes in the population of the city of Linköping

Almost half of those being asked thought that their attitudes toward diet, exercise and smoking had changed since the campaign started, so that they currently thought it was more important to have sound dietary and exercise habits and more dangerous to smoke. Thus, during the last two years a large number of people have become more aware of the importance of positive living habits. Most of them say that information via the press, radio and TV has caused their change in attitudes (Table III). The "Get fit with Corren" ("Piggare med Corren") campaign, however, seems to have had very little effect.

Table III. *Random sample (N=204). Causes of positively changed i attitude concerning importance of health of diet, exercise, and smoking (several response alternatives are possible).*

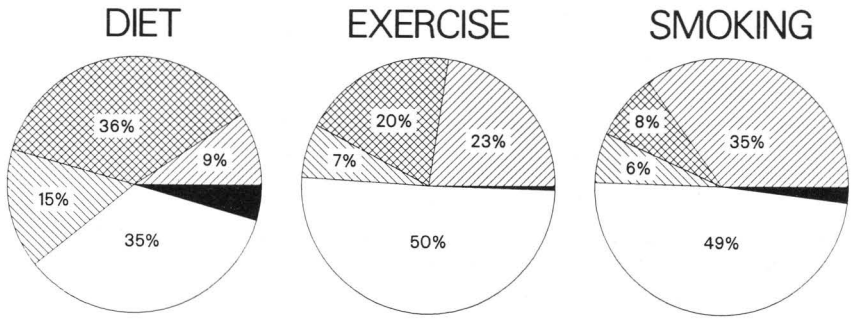
	Diet n=	Exercise n=	Smoking n=
Information via press, radio, TV	63	46	70
Personal experience	45	44	19
"Piggare med Corren"	12	16	17
Influence of friends	14	15	13
Information via brochures etc.	18	10	13
Other	4	2	1
Total	98	87	88

Random sample — changed attitudes and changed habits

An interesting question involtves the extent to which change in attitude is coupled to a change in behaviour and whether there is any difference in this respect between the various reported causes for changing attitudes. A comparison was therefore made between the number of people who improved or did not improve

their habits and the reasons given for the change in attitude. It showed that for every reported cause for change in attitudes, about just as large a percentage of people changed attitudes irrespective of whether this resulted in improvement of the health habit in question. However, smoking constitutes a marked exception in that 59% of those who smoked less report "own experience" as the cause of a changed attitude, compared with only 11% of those who had not improved their smoking habits.

A comparison between changed attitudes and changed habits (Fig. 8) shows that a large number of those who changed their attitude towards diet also changed their dietary habits (80%), but that many of those who did not change their attitude still changed their behaviour(30%). 47% of those who changed their attitude towards exercise also improved their exercise habits, and among those with an unchanged attitude (12%) very few changed their exercise habits. As far as smoking is concerned, a change in habit was not much greater among those who changed their attitude (19%) than among those who did not change their attitude (12%).



	Diet n =	Exercise n =	Smoking n =
Positive attitude change without improved habit	19	46	71
Both positive attitude and improved habit	74	40	17
Improved habit without attitude change	31	14	13
No change	71	103	99
Missing values	9	1	4
Positive attitude change	98	87	88
Improved habit	105	54	30

Figure 8. *Distribution of positive attitude and habit change in random sample (N=204) with regard to diet, exercise and smoking.*

Participants in the campaign — Motives for registering for the anti-smoking part

The most important motives reported for registration for the anti- smoking part of the campaign were "for the sake of health" (72%) and "better fitness" (38%). Of those who registered, 11% succeeded in giving up smoking without starting again during the campaign. Those who smoked at the start of the campaign reported having a number of positive beliefs concerning the benefits of smoking (Table IV). There were also a number of negative beliefs reported as motives for giving up smoking (Table V). In a comparison between reasons for a lack of success and reported motives for smoking, "the smoke desire is too strong" was the most frequent reason attributed to the motive "to give myself a reward". The most frequent reason for non-success connected to the motive for smoking, "in order to get calm", was "too nervous".

Table IV. *Positive beliefs for smoking given by participants who stopped smoking during the campaign.*

Positive beliefs	Number who responded affirmatively, n=	Stopped smoking, %
Gives concentratic	35	11
Gives calmness	64	9
Gives relaxation	99	11
Is "company"	92	9
Is areward for effort	39	10
Keeps the hands busy	52	10
Is stimulating	61	12

Table V. *Negative beliefs about smoking given by participants who stopped smoking during the campaign.*

Negative beliefs	Number who responded affirmatively, n=	Stopped smoking, %
Causes symptoms	64	8
Expensive	87	12
Creates addiction	93	7
Leads to disease	102	11
Not a good example	38	11

Comparison of results for participants in the campaign and the random sample from the city of linköping

The study of campaign participants and the random sample study demonstrate which motives are considered the most important in terms of the *intention*

to exercise more, to exercise *more* and *to* exercise. There was rather good conformity to the motives "better health" and "fitness motive". Reduction of weight was reported as important concerning both in terms of the intention to exercise more and the actual increase in exercise, whereas the recreation motives were important in maintaining of the exercise habit.

Health Profile Assessment as a screening instrument (paper VI)

Presentation of the results from the HPB of the 124 participating 40-year-old employees is based on the extent to which negative components were found in the examinations of each person. The components are comprised of the individual's health habits, perceived health and physiological/medical test measurements. Limits and frequency distributions of negative components are shown in Table VI.

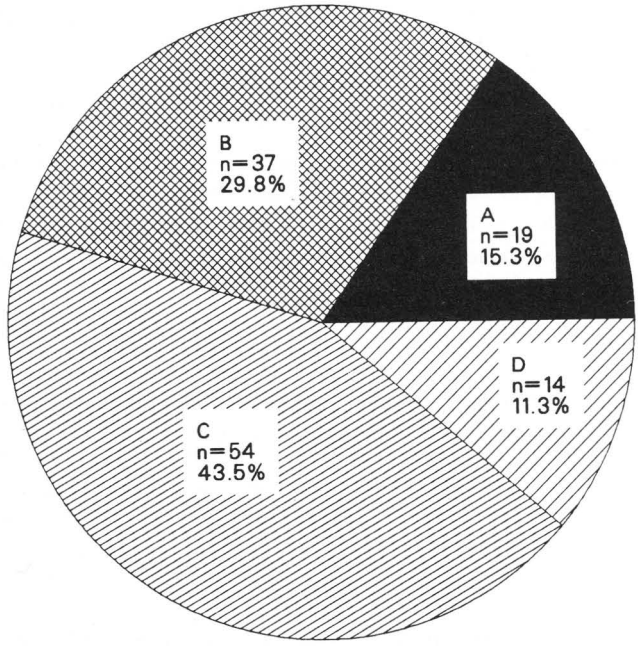
Table VI. *Limits and frequency distribution of negative components originating from "Hälsoprofilbedömning", (Health Profile Assessments) carried out on 124 40-year-old employees at Saab-Scania in Linköping.*

	Limits	Number of persons (n)
Exercise	1–2	61 (49%)
Diet	1–2	68 (55%)
Tobacco use	1–4	39 (31%)
Alcolhol intake	1–2	1 (1%)
Drug consumption	1–2	5 (4%)
Symptoms	1–2	26 (21%)
Perceived stress	1–2	25 (20%)
Perceived loneliness*	1–2	—
Perceived health*	1–2	—
Blood pressure	Too high	8 (6%)
Cardiovasc. Medic.	Yes	1 (1%)
Diabetes	Yes	0 (0%)
Weight	Overweight or underweight	14 (11%)
Cardiorespiratory endurance (CRE)	1–2	17 (14%)

* Questions not included in this study

The participants' low CRE, perceived stress, troublesome symptoms, high blood pressure according to (Andrén et al 1983), and overweight or underweight go along with poor health habits. Only 8 of the 44 participants with burdensome stress and symptoms had these problems without having them coupled with low CRE, poor health habits, high blood pressure, overweight or underweight.

The majority of the 40-year-old employees (55%) had only 0–2 negative components according to the definitions in Table IV. 15% had high blood pressure, took cardiac medication, were stressed very often, had very poor CRE (Fig. 9) or had a total of at least four negative components.



A. High blood pressure, cardiac medication, very often stressed, experiences some symptom very often, very low cardiorespiratory endurance or a total of >3 negative components.

B. 3 negative components or totally inactive physically.

C. 1–2 negative components.

D. 0 negative components.

Figure 9. *Presence of negative health components in 124 40-year-old employees participating in "Hälsoprofilbedömning", HPB, (Health Profile Assessment).*

Reported reasons for "no more exercise" in the Saab-Scania random sample (paper VII)

In the study at Saab-Scania most of those who reported that they had lately begun exercising responded to the question about what or who has influenced this decision predominantly by stating that it was their "own conviction" (Table VII).

Table VII. *Factors influencing more exercise lately (several answers possible).*

If you have begun to exercise regularly lately, what or who influenced your decision?

	n=
Own conviction	170
Another person or persons	32
Other reasons	20
Work test or HPB	12
Ordination from health care personnel	4

Only 18.5% of those asked considered themselves to be sufficientlty active so that they therefore did not exercise more, and not even 1% did not exercise more because exercise was not so important. The predominant explanation as to why they did not exercise more was that there was not enough time.

A comparison between the leisure time activity profiles of those who never exercised (wearing exercise clothes and for the purpose of improving one's condition or health) and those who exercised regularly at least three times a week shows that those who were very active exercisers were considerably more active in their leisure time than the non-exercisers (Fig. 10).

Of those who indicated a lack of time as a reason for not getting more exercise, there were only 15% who never exercised, or just as many as there were of those who were very active exercisers (Table VIII). There is no difference between those who indicated a lack of time for exercise and the others concerning civil status and the amount of time needed for travelling to and from work. Of those who considered themselves to be sufficiently active there were 31% who never exercised or exercised only now and then.

Of those who indicated a lack of time as an explanation as to why they did not exercise more, an aversion to utilizing work time for exercise was greatest among those who never exercised (36%) and the proportion that were clearly positive was smallest. The most active were most positive toward utilizing work time for exercise (76%) and they were least negative and doubtful.

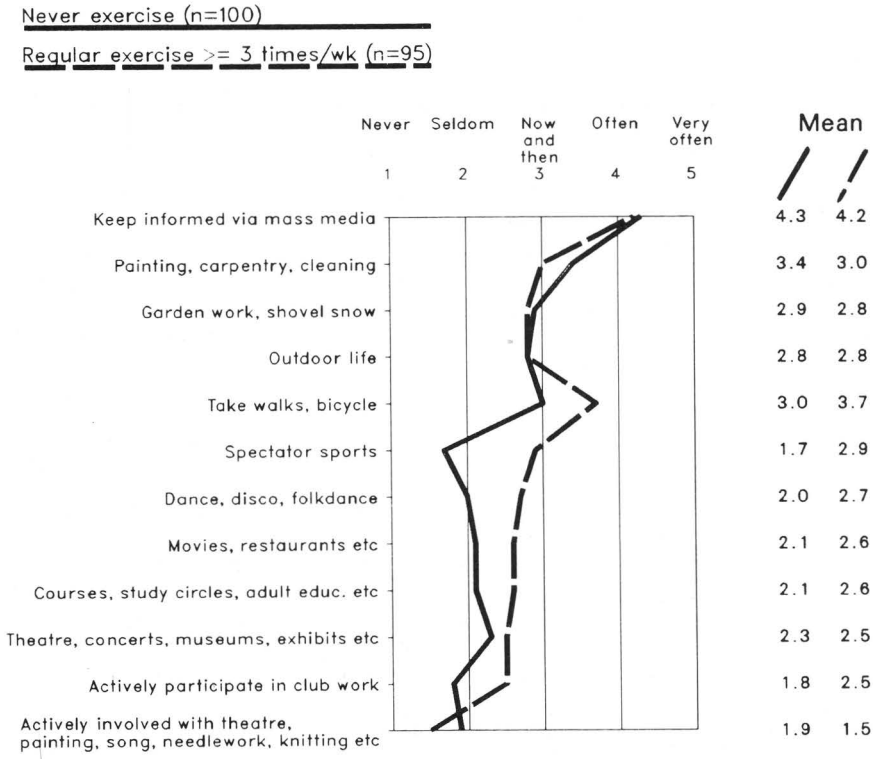


Figure 10. *Leisure time activity profiles for exercisers and non-exercisers.*

Table VIII. *Reported resons for not getting more exercise the past year distributed according to exercise habits (col %). More than one answer possible.*

Exercise habits	n=	Sufficiently active	Lack of time	Haven't gotten around to it	Illness, locomotor problem, injury	Think exercise is boring
Never	100	13(14%)	31(15%)	39(29%)	16(36%)	16(52%)
Now and then	157	16(17%)	68(33%)	61(45%)	12(27%)	10(32%)
1–2 times/wk	158	26(27%)	74(36%)	28(20%)	10(22%)	4(13%)
≥3 times/wk	92	40(41%)	29(14%)	6(4%)	6(13%)	0(0%)
Missing val.	13	1(1%)	3(2%)	3(2%)	1(2%)	1(3%)
Total	520	96	205	134	45	31

DISCUSSION

Methods

A reductionistic approach is combined with a holistic viewpoint.

Since systems theory holds that all levels of organizations are linked to each other in a hierarchical relationship, so that change in one effects change in the others, its adoption as a scientific approach should do much to mitigate the holist-reductionist dichotomy (Engel 1977). This makes it possible to combine a holistic viewpoint with a reductionistic approach (Chotai 1985). While the questions at issue in papers I–IV deal primarily with social hierarchies, the questions in the other papers deal primarily with the level of the individual. Analysis of data from all the studies is done from a holistic viewpoint, with a focus on the rules structure which balances the self-assertive and the integrative tendencies in the individual.

Limitations of the questions at issue based on the design

The following must be taken into account when evaluating the possibilities of elucidating, by means of the studies, the primary question in the dissertation, i.e. how different types of health information can start a restructuring process in this rules structure. The reported behaviour changes in connection with the campaign concern a two-year period. Based on the results it is not possible to predict developments which will occur within a longer time perspective.

Possible changes in the rules structure in the social hierarchies during or after the campaign year are not evaluated. Such changes - new contracts, laws concerning smoking, diet exercise — can indirectly influence, in the long run, the individual's behaviour and inner structure of rules (Tones 1981).

The results show that the greatest chance for permanent change arises when it is experienced as one's "own conviction". This conviction may have been preceded by a long, inward process which is so effective that the individual really experiences it as his own conviction and is not aware of what initiated the process. This limits the chance to evaluate the effects of different types of information about health.

The design and dropout problems (papers I, II, III, IV)

The material in papers I and II, consisting of the 50–59 year old emloyees at Saab-Scania in Linköping, comprised a total population study of employees in a special industrial field survey, and the observed differences between the subgroups are factual. The dropout group was 18% of the total population and is discussed under "Target groups".

The random sample from the city of Linköping is small (papers III, IV). A 95% confidence interval in the random sample yields such uncertainty that

generalizations to the population are limited. The results from this study, however, have been used primarily in a discussion of intrapersonal processes. The generalizations which are made to the population of Linköping are interpreted very cautiously with reference to the results from the study of the persistent campaign participants.

The design and questionnaire response problems (papers III, IV, V)

It was natural for us to choose the city of Linköping for our study, since 83% of the households subscribed to the newspaper and 78% of the registrants came from there (papers III, IV, V).

Methodologically, we combined a total population study of those who appeared to be the most interested and persistent as registrants in the campaign with a study of a random sample from the city of Linköping (Fig. 4). This gave us the opportunity to examine the most actively engaged persons, and to investigate how many persons may have participated without actually registering.

We have probably received responses from those who have been the most successful in improving their habits. This is reinforced by our analysis of the group of campaign registrants who went through the fitness test (Fig. 6). The analysis comprises slightly more than half of those who did not answer the questionnaire. The results show that those who answered the questionnaire improved their estimated aerobic power to a greter extent than did those who did not answer the questionnaire. The analysis also showed that this group contained fewer persons who were smokers and non- exercisers before the campaign began.

We find the same pattern in a comparison between those who went through one or through both tests. Those who came back at the end of the campaign to complete a work test and discuss their success in reaching their goal of behaviour modification initially had better exercise and smoking habits.

The most dedicated participants apparently had better health habits than the rest of the registrants. For obvious resasons they were also the most willing to discuss their results.

With this dropout analysis we have consequently been able to show that those persons in our total population study who answered the questionnaire are persistent participants in the campaign.

Health Profile Assessment and reliability (papers VI, VII)

A standardized questionnaire, in combination with standardized instructions for answering, constitute the basic prerequisites for good reliability in the psychological part of the HPB. The method also requires at least a week's training in the theoretical background of the method and the practical application of the standardized techniques. This is also important for the physiological and medical tests, which require certain basic knowledge. Thus high reliability presupposes good standardized training combined with standardized forms.

Life style

Awareness of one's own responsibility and inner balance

A sound lifestyle which promotes health requires that the individual take responsibility for his health and it also requires the insight that one's own behaviour and inner balance affect one's health. This involves awareness of the importance and application of a lifestyle which takes both the integrative tendency and the self-assertive tendency into account (Fig. 1), since both are "equally ubiquitous in the competitive struggle for life" (Koestler 1967).

Too high a demand for achievment a risk for illness

The importance of social ability and social commitment were analysed in the introductory section "theory", while the importance of flexibility in the rules structure is discussed here. To prove satisfactory to the integrative tendency involves, among other things, being good for higher hierarchies by being of worth to society by means of good work performance. The individual's demands upon himself, however, should not be too high. If an individual concentrates too much on achievment, his chances of attaining consistency between his rules system and his actions become worse. His definitions of competence and achievement are so extreme that he constantly sees himself as failing to live up to them. The reason is quite simply that a level of performance is demanded which normal human limitations do not permit, owing to the need to rest and to do other things to satisfy organismic needs (Totman 1979).

Reports from many sources confirm that coronary-prone individuals tend to feel dissatisfied with their achievements (Friedman 1964, Theorell et al 1972, Romo et al 1974). Coronary patients have also been described as being excessively attached to their work (van Dijl I975) and extremely involved in their social life and leisure time activities (Russek 1958). Other research shows a relationship between excessive conscientiousness, perfectionism, and lung cancer (Abse et al 1974), rheumatoid arthritis (Moosl 1964) and ulcerative colitis (Engel 1955).

A repressive coping style could indicate a future risk of illness (paper II)

A subproblem in regard to a high demand for achievment is a repressive coping style. When we analysed salaried employees (paper II) in greater detail with regard to the level of their education and the amount of responsibility that their positions entail, we found that there is only one group — those with a higher level of responsibility than education — which shows high blood pressure in combination with a low rate of absenteeism (Fig. 5). Most of the employees in this category are ambitious and their duties involve increased responsibility, but these duties are at such a low level that the employee's influence is limited. This

combination of personality and responsibility seems to increase the occurrence of high systolic blood pressure, which supports earlier findings (Karasek 1979).

As stress is thought to have considerable effect on blood pressure (Selye 1950, Lundin 1981), a logical interpretation would be that people with a high degree of ambition (type A behaviour) (Friedman et al 1959) stress themselves. Their ambition often causes them to ignore their body's warning signals, and stress continues to mount as they work .

This mechanism for producing inattention is a psychological defencive coping style, broadly termed "repressive" (Schwartz 1983). Individuals prone to use a repressive coping style will tend to deny experiencing distress in stressful situations, and will deny experiencing negative emotions in situations where such emotions are normal and appropriate (Schwartz 1983). A study comparing normotensive and hypertensive subjects in terms of measurements of cardiovascular activity and self reports during a stressful speech showed that in hypertensive subjects, blood pressure responses during the speech task were negatively correlated to a self reported state of anxiety (Schwartz 1983). A repressing coping style and, in this case, the combination of high blood pressure and a low rate of absenteeism, are indicative of that there is a greater risk of future illness, as is supported in earlier findings (Theorell et al 1975).

A wholesome lifestyle consequently also is characterized by the individual's consideration of the self-assertive tendency in his rules system and the realistic adaptation of his need for achievment so that mental-physical feed-back signals are not repressed. A person's resistance to disease remains high provided that he has continual social involvment and he is active and working towards a definite goal, and also provided that his beliefs, attitudes and norms are sufficiently flexible (Totman 1979).

Too high a level of exercise increases the risk for injuries (paper IV)

Exercise is important for health and well-being if the level and number of activities are not exaggerated. Our results from the campaign (paper IV) show an increased risk of injury at a high activity level. We note that it is not the persons with low levels of activity who run the greatest risk of sustaining injury when they start exercising. The rate of injuries seems to depend on the number of different activities, whether or not they have recently been started. There was no significant difference in injuries between the group which had increased its mean number of different activities from 1.8 to 3.2 activities and the group that remained unchanged with 3.2 activities. Furthermore, the frequency with which the activities were done seemed to be of great importance. The rate of injuries was about double in the group which had exercised 3–5 times a week before the campaign as compared with beginners and less active exercisers. Consequently, too high level of exercise seems to increase the risk for injuries, as is supported in earlier findings (Allman 1971, Lutter 1980, Orava 1980, Piterman 1982).

A consideration of the self-assertive tendency thus does not mean a mechanical, achievment-directed application of health rules. A sensitivity to physical

and mental signs such as pain, fatigue, stress and the ability to see their relationship to one's own behaviour is of central importance.

Communication

The process of change

According to the communication model (Fig. 2), for the initiation of a behaviour change it is required that the information, possible with the help of noninformational manipulation, not only is permitted and accepted but also that, in a multistep process, it results in a change in the beliefs which can yield the desired change in attitude and subjective norm so that mutual adjustment processes result in a specific intention to a specific change. For adherence to a new behaviour it is required, in addition, that the cognitive feed-back process for approval of the new behaviour lead to change in the prevailing rules structure so that approval is given for the new behaviour and cognitive balance arises (Totman 1979).

As is evident from "general systems theory", such a change in the rules system can involve change not only in the mental rules hierarchies but also in many different rules hierarchies. Changed dietary, exercise and smoking behaviour also result in feed-back in the biological and social hierarchies. As a member of a family or work group, a new behaviour is evaluated. If the new behaviour is in accord with a corresponding change in the social hierarchies, this provides obvious support to the individual's integrative tendency. It should thus be easier to start exercising, stop smoking, or change one's dietary habits in a group (McAlister et al 1985, Martin et al 1985). The risk of relapse into earlier behaviour, however, is great when one no longer has the support of the group (Oldridge et al 1978) if one's own rules structure hasn't changed so that the integrative tendency is balanced with the self- assertive tendency which gives biological and psychological feed- back.

Self insight is needed concerning beliefs which constitute obstacles to adherence

In contrast to negative feed-back, positive feed-back in the form of mental-physical well-being makes desired change in the rules structure easier. The feed-back is affected in turn by the positive and negative beliefs concerning the new behaviour the individual already has.

For permanent change it does not suffice for information to be conveyed about the benefits of the new behaviour. Processes must also be initiated (possibly by means of noninformational manipulations) which lead to self insight concerning the beliefs which constitute psychological obstacles (Sallis et al 1986) to adherence to a new behaviour.

Revelatory communication — a new concept

A common concept for health information is persuasive communication. The concept revelatory communication, derived from the word reveal has been introduced in this dissertation. This is to make it clear that we are not dealing with persuasion but instead the initiative to change must lie with the individual himself. The communication should reveal something new to the individual which provides an inner elucidation of his own rules system and the beliefs which are obstacles to behaviour change, so that a continuous cognitive process can be initiated for the restructuring of the rules system, which provides balance to a new behaviour.

The analysis of results in relationship to the theory (paper V, VII) indicate that in order to create "revelatory communication", more is required from a communication situation than that the conveyance of information is permitted (Fig. 2) and accepted. The individual must also be motivated to provide new information to himself which supports a continued process of change. In addition, the individual must be motivated to try within himself to become aware of the different primary beliefs which direct his behaviour and which constitute obstacles to a permanent process of change. Noninformational manipulation can also be of varying motivational significance in this communication situation.

The campaign seems to have drowned in other mass media information (paper V)

83% of Linköping households subscribe to "Östgötacorrespondenten" (paper V). 19% of the random sample never read about the campaign, whereas 18% not only accepted it but actually sought information about it when they took part in or regularly followed the campaign (Fig. 7). It is difficult to determine how many of the rest accepted it since surprisingly few said that the campaign had been responsible for their changed attitudes towards diet, exercise, and smoking (Table III). The campaign seems to have drowned in other mass media information which, when combined with pressure from friends and with brochures and other propaganda put out during the campaign year, resulted in about half of the Linköping inhabitants changing their attitudes. They realized more clearly that it is important to eat nutritionally satisfactory food, to exercise in order to feel well, and not to smoke. These reported changes in attitude may have paralleled changes in the subjective norm and possibly also in the mutual adjustment of the two.

"Personal experience" is of particular importance

Our response alternative "personal experience" was designed to reflect the experience of such a mutual adjustment process. There is a greater chance for a behaviour change when the subjective norm in personal experience is integrated with one's attitude. Our results support this assumption, because very few give "personal experience" as the reason for a changed attitude towards smoking,

in contrast to diet and exercise (Table III), and because fewer individuals cut down on or stopped smoking than improved diet and increased exercise, even though almost as many persons claimed to have changed their attitude towards health (Fig. 8). That this personal experience is of particular importance with regard to smoking becomes evident when change or no change in health habits is compared with reported reasons for changed attitude. A marked difference only emerges between people who changed health habits and people who did not with regard to smoking and "personal experience". Of the persons who cut down on smoking, 59% gave "personal experience" as the reason for their changed attitude; only 11% of those who did not reduce their smoking gave this reason.

Health information failed to supply sufficient new knowledge

Concerning attitude and behaviour changes, the differences between diet and exercise, and especially between diet and exercise on the one hand and smoking on the other, may perhaps be explained by the fact that the relative values of the subjective norm and the attitude vary as a function of the behaviour in question. Health information supplied by the mass media can influence the subjective norm, i.e. the experts' advice, "Change your habits!", and it can change the attitude by enlightening the individual about the favourable consequences for health that a change in habits can bring about. If the subjective norm is to be changed, the individual must be sufficiently motivated to comply with the advice.

It is difficult to supply sufficient motivation by means of mass media information, especially, as is obvious, with regard to smoking. This also applies to influences on attitude, which is based on the entire set of beliefs which imply that performing the behaviour will lead to certain consequences. With regard to smoking, our findings among the highly motivated participants in the anti-smoking campaign reflect certain positive (Table IV) and negative (Table V) beliefs. The most common negative belief was that "smoking will lead to disease". Health information has failed to supply sufficient new knowledge here (Gadourek 1965) because the individuals already know the risks, and it is clear that in their own mutual adjustment of their negative and positive beliefs most people (about 90%) did not get enough support to succeed in stopping smoking, even though they professed that they wished to do so (Bjurulf 1970, O'byrne et al 1981).

Nevertheless, the health motive seems to be of essential importance as a portal of entry to improved health habits (Mann et al 1969, Teraslinna et al 1969,1970, Zunich et al 1979, Blair et al 1984, Zerfass et al 1984). This is evident when motives are compared for "intention to exercise more", "to exercise more" (change of behaviour), and "to exercise" (adherence to the behaviour); the health motive and "improved fitness" are important in all three. Participants also declared that health reasons are highly important in the motivation to improve smoking habits: 72% gave improvement in health as their motivation

for taking part in the anti-smoking part of the campaign.

It is essential to find alternative behaviours with favourable outcomes

However, the findings in the campaign studies (paper V) may help to explain why even copious amounts of health information in the mass media will fail to bring about the desired changes in behaviour, even among the most motivated. As mentioned earlier, it appears that in order to succeed, the influence on behaviour must initiate an intrapersonal multistep process which presupposes involvement of several beliefs, and valuation and decision processes in which positive and negative beliefs are weighed against each other. In this process it is also important to reach every individual with information adapted to give that particular person an impulse to bring about change (Dishman et al 1980,1981, Zerfass et al 1984). For example, a person can hold negative beliefs coupled to smoking, such as that it is expensive, it leads to illness, and it creates addiction (Table V), while at the same time having positive beliefs such as that it is calming and relaxing, it makes me feel less lonely, and it keeps my hands busy (Table IV). Under such circumstances strengthening his negative beliefs is not enough. It is also essential to help him find alternative behaviours that produce the same favourable outcome. Our results show that the strongest reason for reverting to smoking among those saying they smoke to be calm is "too nervous", and among those who smoke to increase their concentration it is "work is too stressful".

Consequently, even if a process of change is initiated, much time may elapse before a permanent change in behaviour is established. Consequences of the new behaviour experienced by the individual can become retroactively associated with certain beliefs and can come to act together with them to create a new change of attitude, with the result that the intention becomes changed towards regression to the previous behaviour.

"Own conviction" the dominant reason for starting exercise (paper VII)

In the study at Saab-Scania in 1983 (paper VII), the most dominant answer to the question about what or who had influenced those who had recently begun exercising regularly was "own conviction" (Table VII). A smaller number mentioned other persons or reasons and only a few mentioned the work test or the HPB. According to the communication theory (Fig. 2) and the previous discussion, this is not surprising.

As mentioned earlier owing to the complexity of the process of change, it can be difficult to evaluate exactly what initiated the process and what, perhaps over a longer period and in different connections, may have reinforced it.

"Dropouts" shed light on the need to change the individual's rules structure (paper VII)

It is evident from the fact that most of those who exercise regularly at Saab-Scania are among those who previously or currently utilize the Physical Fitness Centre (paper VII), that a Physical Fitness Centre with a stimulating social environment, personnel for advice and counseling, testing, HPB, different rehabilitation programs, etc., are very important. According to general systems theory, these kinds of activities in the social hierarchy gives support to the individual's integrative tendency. Half of those who previously utilized the Physical Fitness Centre, however, are only sporadic exercisers or do not exercise at all.

This demonstrates the problem of adherence (Serfass et al 1984, Martin et al 1985) and also the need for change in the individual's own rules structure and the beliefs behind it.

Almost everyone thinks exercise is important but only half of these individuals exercise

Our results from the random sample at Saab-Scania (paper VII) show that people are often not aware of all these beliefs or of the opposition which can exist among them. Almost everyone thinks exercise is important, but nevertheless only about half them exercise (wearing exercise clothes and for the purpose of improring ones's condition or health). Only 18.5% do not exercise more because they think they are already "sufficiently active". In addition, 31% of them exercise only sporadically or do not exercise at all (Table VIII). The latter individuals obviously think that they are sufficiently active through some other form of activity. A comparison between this category and those who exercise very actively (Fig. 10), however, shows that "non-exercisers" only take walks and bicycle rides sporadically and are otherwise much less active than those who exercise most actively.

It is important to reveal to individuals why they "haven't got around to" exercising more

The most frequent answer to the question as to why a person does not exercise more is "lack of time" (Table VIII). It seems, however, to be more a matter of a lack of energy (Hunt et al 1981) and a lack of the desire for activity than a lack of time, since those who exercise very actively are also much more active in other respects in their leisure time than are those who do not exercise. The belief of non-exercisers concerning "lack of time" can therefore be due to normative beliefs which give a low priority to regular exercise. That this may be the case is confirmed by the results which show that of those who never exercise and report a lack of time, less than half would want to use time at work for exercising and more than one third say "no", in contrast to those who are already active and who are very positive.

Besides lack of time, the most common explanation for non- exercisers and sporadic exercisers for not getting more exercise is "haven't got around to it". These persons are simply not aware of which beliefs may cause one "not to get around to it" (Table VIII), despite the fact that they are aware that exercise is important. Those who think that exercise is boring are few and they are found primarily among those who do not exercise regularly. In these cases there are "beliefs about the consequences" of beginning to exercise which are not based on experience, since only 1% report that previous experience with exercising was disappointing.

The HPB as revelatory communication (paper VII)

This indicates the need for an instrument such as the HPB, which provides an opportunity to initiate an intrapersonal process in which the individual becomes aware of his beliefs and in the long run is able to change them so that an intention for the desired behaviour change arises. The HPB has been developed from the theoretical framework which was described earlier. According to this theory man can be viewed as a fairly rational processor of the information available to him (Fishbein et al 1975).

Thus the HPB is based on the assumption that every individual can learn to trust himself, to think for himself, and to make his own decisions regarding a change in behaviour. The purpose of the HPB is to begin a process within the person in which his current life style is rationally evaluated and in which he is made aware of the beliefs which lie behind his different health habits, and in which these beliefs are reconsidered. It is therefore important for the person administering the HPB to create a very positive relationship and good conditions for optimal intellectual exchange.

The interview is begun with a question concerning physical activity during the years the person was growing up and is intended, along with supplementary questions, to bring to the fore and make conscious the beliefs which came into existence during childhood and adolescence. By means of questions the working situation, health habits, the social situation and the person's perceived health, gradually come up. When measurements are begun a natural concentration on rational communication occurs. Detailed information is given about the background of the methods and interpretation of the measurements. A person undergoing the HPB thus continuously takes part in a logical discussion concerning the significance and interpretation of the new information.

Not only inferential beliefs are influenced in this way through revelatory communication. Descriptive beliefs, which are formed on the basis of direct observation, are also influenced through active participation (Fishbein et al 1975). When the submaximal work test is carried out, for example, the person indicates the amount of perceived exertion expended in the final minute. By relating this to the actual load, the individual receives directly experienced information, which is quite likely accepted, concerning his actual work capacity.

Discussion leads to decision based on one's own conviction

In the final discussion the connection takes place between the test values and the experience of the tests on the one hand, and the different components of the HPB on the other. Great importance is attached to having the person who is undergoing HPB take part in the logical discussion in which his own assessment of the components of his lifestyle are related to the different test values and to his own experience of his social situation, stress, symptoms and health (Serfass et al 1984). It is very important to reveal to repressive persons, who underestimate the stress they perceive, the connection between stress, psychosomatic symptoms, perceived health and blood pressure. Supplementary information is given as the basis for an inference process which can generate and/or strengthen beliefs concerning a certain behaviour resulting in certain consequences. A logical decision based on one's own conviction to change behaviour (intention) can be made in order to attain better health, or avoid illness, in the short or the long run.

A written contract stimulates the initiated process

The inference process which precedes a decision about behaviour change is so complex, however, that it can take a long time before a specific intention is formulated so concretely that it can be transformed into a specific change in behaviour. The length of time is determined by, among other things, how long and with what intensity a process of change, with the change in question as the goal, has already been in progress. The HPB is therefore often concluded with a written contract for change which stimulates the initiated process (Leon 1983, Serfass et al 1984) and in which the client makes a continued analysis of his life style in terms of a comparison between current and desired health profiles. Initially the decision can only be made about one change. This is described concretely and reasons are given, and time-points for starting and for follow-up are specified, which makes feed-back possible with reinforcement of the new behaviour (Martin et al 1985). It is important to find the costs and rewards which are relevant to a particular person and to a particular behaviour change situation (Jenkins 1979).

Target groups

The communication discussion shows the difficulties involved in initiating and creating permanent changes in lifestyle in an individual. An additional large problem is to reach those individuals who are in the greatest need of change.

The campaign did not activate nonexercisers (papers III, IV)

From the random study (paper III) it can be seen that at least three quarters of the inhabitants of Linköping above the age of 17 years had read about the

campaign, and that only a very small percentage did not know about it. In spite of this awareness, only few participated.

This campaign consequently seems to have followed the expected pattern for mass communication (Klapper 1960). The health information reached most of the population but only a small segment registered and even fewer participated.

It is important to note that the campaign did not succeed in activating nonexercisers (paper IV). Only 5% of those who answered the questionnaire reported that they had not exercised before the campaign, and 44% had exercised at least 1–2 times a week. Also other of our results show that it is those who already consciously live a more wholesome type of life who are influenced and try to improve their health habits even more when they come in contact with a broad health promotion effort, and they succeed in doing so.

There is a need for screening and follow-up (paper IV)

A more deliberate, effective way of influencing the health habits, by means of health information, of those who need it most therefore requires some methods of screening those in whom it is important to take additional interest.

When forming groups based on treatment programs, particular attention should be paid to the risk of future illness and to available resources. The smaller one makes the high risk group, the greater the relative risk of illness in the defined group at the same time it comprises a smaller and smaller part of the total expected incidence in the group. One must therefore include the group at medium risk, which results in a greater quantitative effect.

Screening of individuals at 40 years of age (paper VI)

In our study of 40-year-old employees, we have therefore chosen to distinguish 4 groups with different risk levels (Fig.9)(paper VI). In the high risk group (A 15%) there are those who are already ill or experience symptoms, those with high-grade stress or who are in very poor condition, and those who can be considered to have a generally increased risk of poorer health and well-being because of at least four negative components on the health profile (Fentem et al 1981). Furthermore, two medium-risk groups have been discerned comprising B (30%), C (44%), and one group without negative components. Group B contains individuals with a total of three negative components on the HPB or who are totally inactive physically. The risk level decreases additionally in group C with 1–2 negative components on the HPB.

Different follow-up for different groups

The resources available to these groups are different. Those who belong to the high risk group (A) most often undergo a medical examination and a survey of their place of work and then take part in different health education programs at Saab-Scania's Physical Fitness Centre during working hours. In addition to feedback in a comprehensive discussion in the HPB, risk groups B and C also

get a form which they take home for comparison between their desired and their current health profiles. From this comparison a contract can be signed for behaviour change and an appointment can be made for follow-up in terms of another HPB. Brochures with information about the significance of different health habits, high blood pressure, stress, and other factors are given out to those who are motivated. And for group D, the final discussion in the HPB is often of great importance. In this group there are also those who want to exercise too much and too intensively, which increases their risk of injuring themselves (paper IV) and can decrease the preventive effects of exercise in regard to cardiovascular disease (Stubbe et al 1983).

The dropout group is an important target group

Even with effective screening and differentiated follow-up, another big problem still remains. Our study of sick leave (paper I) shows that the number of days reported sick was three times as high in the dropout group. The fact that so many of the people with the highest rate of absence did not participate in the interview and the work test shows how difficult it is to reach these people with health education.

Some of them were sick and not at work at all during the time we carried out the investigation, and were therefore not available. Others could not be convinced to participate. This shows the importance of a special visiting program in regard to the cronically ill, and the significance of an effective program to help those who need help but may not seek it.

Those with a high frequency of absenteeism and with varying mental and physical symptoms of illness often go to the physician for individual advice. If we refer them to preventive health care programs, we can help a number of those who are most difficult to motivate to find their own way to sounder health habits.

GENERAL SUMMARY AND CONCLUSIONS

Our results from the studies of the very extensive one year "Corren campaign" show that the amount of health information offered in the mass media is large and extensive, although very few of those who reported positive attitude changes thought they had been influenced by this campaign, but rather by the mass media as a whole.

Both studies of the "Corren campaign" show that the campaign reached the majority of Linköping's inhabitants but that only a small percentage participated in and followed it regularly. It is also important to note that the campaign did not succeed in activating nonexercisers. Only 5% of those who answered the questionnaire reported that they had not exercised before the campaign, and 44% exercised at least 1–2 times a week. Also other of our results show that it is those who already consciously live a more wholesome type of life who, when they come in contact with a broad health information effort, are influenced and try to improve their health habits even more and also succeed.

Exercise is important for health and well-being if the intensity and number of activities are not overdone. Our results from the "Corren campaign" show that with a high level of activity there is an increased risk for injury. We can note that it is not the persons with low levels of activity who, when they start exercising, run the greatest risk of sustaining injury. The rate of injuries seems to depend on the number of different activities, whether recently started or not. The rate of injuries was about double in the group who had exercised 3–5 times a week before the campaign as compared with beginners and less active exercisers.

Our results consequently demonstrate the difficulties in reaching the right target groups with health information and that there are also certain risks for injurious side effects. There is theoretical support for this and support is also found in other research which shows that being too involved in one's social life and in leisure time activities can constitute a risk for illness.

Theoretical elaboration is therefore required as a basis for the development of individually adapted health information. This theoretical elaboration has been carried out and coupled with practical experience and empirical research.

Our results demonstrate the importance of revealing to the individual the beliefs which can constitute psychological obstacles to the initiation of an intrapersonal process which results in his own decision to change something in his lifestyle.

The Health Profile Assessment was designed to give the individual the chance to directly experience information which is closely associated to his own lifestyle. In the face to face conversation his own lifestyle is weighed against this information, and the relationships between his own experienced stress, symptoms and health are discussed. The individual is given the experience of seeing his own lifestyle in a new way so as to make his own decision about possible behaviour change. The concept of "revelatory communication" has been introduced to describe this type of communication.

People's lifestyles vary and their needs for health information accordingly also vary. Screening methods are therfore needed.

In a study of 40-year-old employees at Saab-Scania, we have shown that the Health Profile Assessment can be used for screening those in whom it is important to take additional interest. Different risk groups are defined and the different resources needed for these groups are exemplified. Those who belong to the high risk group most often undergo a medical examination and a survey of their work environment, and then they join various health education programs at the Physical Fitness Centre during their working hours.

In developing the method of Health Profile Assessment, great importance has been attached to standardization and practical formulation. Consequently, the Health Profile Assessment has been developed step by step under very extensive practical application and testing and has been found to be feasible both in health promotion.

The next step in the research process will be experimental studies for evaluation of the effectiveness of the HPB as an instrument for revelatory communication and screening.

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I

Risk factors and reported sick leave among employees of Saab-Scania, Linköping, Sweden, between the ages of 50 and 59

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Risk Factors and Reported Sick Leave among Employees of Saab-Scania, Linköping, Sweden, between the Ages of 50 and 59

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Risk factors and reported sick leave among employees of Saab-Scania, Linköping, Sweden, between the ages of 50 and 59. Andersson, G. and Malmgren, S. (Department of Preventive and Social Medicine, University Hospital, Linköping, Sweden).

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An investigation group, consisting of all 1 313 employees in the age range 50–59 years, in 1975 was called during working time to the Company's Physical Training Centre to have certain risk factors assessed. The evaluation included an interview which covered risk factors such as smoking and exercise habits and measurements such as systolic blood pressure, height, weight and certain anthropometric measurements. Information was also obtained from the personnel records regarding sex, age, form of employment, education code and reported sick leave in 1974 and 1975 for the workers, and between 1970 and 1975 for the salaried employees. The total number of dropouts was 238, or 18%. Absenteeism among those who did not participate in the interview and measurements was markedly higher than for those who did. The fact that this group dropped out of the investigation implies a high risk and a need for preventive programmes. The single risk factor that showed the strongest connection with absenteeism was a low degree of physical activity during leisure hours. The design of this study as a cross-section investigation limits its use to assessing the current degree of correlation between different risk factors and absenteeism. We cannot, then, predict future illness on the basis of these findings.

BACKGROUND

A new law has been passed in Sweden with regard to public health and medical care, whereby preventive public health work is accorded greater priority than before. During the past decade, several County Councils (*landsting*) have approved special plans for public health. Company health services whose main task is to prevent ill health are growing at a rapid rate.

However, there is still a great deal of uncertainty as to how we can optimize the health of the Swedish public. Improvements have been made in working environments, and we are beginning to put more emphasis on the importance of good health habits (2).

The purpose of our investigation was to study the connection between health habits and absence due to illness of a group of older industrial employees.

MATERIALS AND METHODS

This is a complete investigation of employees in a special industrial field survey (6). The group investigated is presented in Table I. In 1975 all individuals in the investigation group were called during their working time to the Company's Physical Training Movement Centre to be evaluated. Information was obtained from the personnel records about sex and age. For the workers, the number of days reported sick in 1974 and 1975 were recorded. For the salaried employees the number of days reported sick between 1970 and 1975, as well as the education code and level of responsibility (9) were taken into consideration. Workers' sick days included only the number of working days on which he/she could be reported sick (max. 269 days/year). Salaried employees had a maximum of 334 days, including all the days of the year except holidays.

The interview covered physical exertion at work, way

Table I. *All employees of the Aerospace Division of Saab-Scania AB, Linköping, Sweden, in the age group 50–59 years*

	Men	Women	
Workers	94% 512	6% 33	42% 545
Salaried employees	90% 691	10% 77	58% 768
	91% 1 203	9% 110	100% n=1 313

Table II. *Drop-out reasons because of not participating*

	Workers		Salaried employees		
	Men	Women	Men	Women	Total
Declined because of physical handicap	53	2	30	3	88
Declined for other reasons	62	2	35	4	103
Reported sick	24	–	20	2	46
Deceased	–	–	1	–	1
Total drop-outs	139	4	86	9	238
Percent drop-outs	27	12	12	12	18.1

of travelling to work, smoking habits, physical training before age 20 and current exercise habits.

The measurements taken included systolic blood pressure, length, weight and certain anthropometric measurements. The blood pressure was taken after about 10 minutes in a sitting position. The exercise tests were performed on mechanically braked bicycle ergometers (12, 13, 14).

A nomogram was used to determine the maximum capacity for absorbing oxygen from the working pulse and the load. Physical condition figures were calculated using skeletal weight and working pulse (4). Body composition was determined anthropometrically (5).

Drop-outs

The members of the investigation group who, despite personal contact, failed to appear, are categorized in Table II. The material has been computerized with the program package SPSS (7) and OSIRIS (10).

RESULTS

Groups with high vs. low rates of sick leave

AID analysis (7) was used to analyse the number of sick leave days in 1974–75. As predictors we used sex, age, blood pressure, test value, physical condition figures, smoking, physical training, weight, oxygen absorbing capacity, overweight, participation in interview/measurements and the completion work test. Education and level of responsibility were also used as predictors for the salaried employees.

With regard to the workers' absence days any further breakdown into smaller groups as unlike each other as possible could only take place via the predictor "participant of interview/measurement" (Fig. 1). Those who had not participated in interviews and measurements were defined as the group with the highest rate of absence days. The strength of the other predictors was not sufficient to indicate further subdivision.

Persons in the "incomplete work test" category include those who have participated neither in the interview nor in the work test on the bicycle ergometer, have participated in the interview without being able to carry out the work test for medical

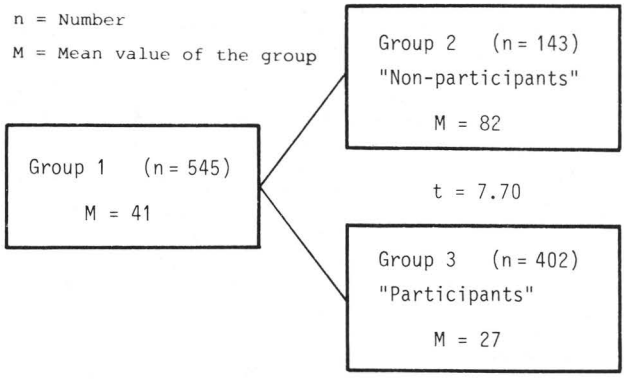

Fig. 1. AID analysis of total number of absence days reported sick, for 1974–75, workers. *n* = number, M = mean value of the group.

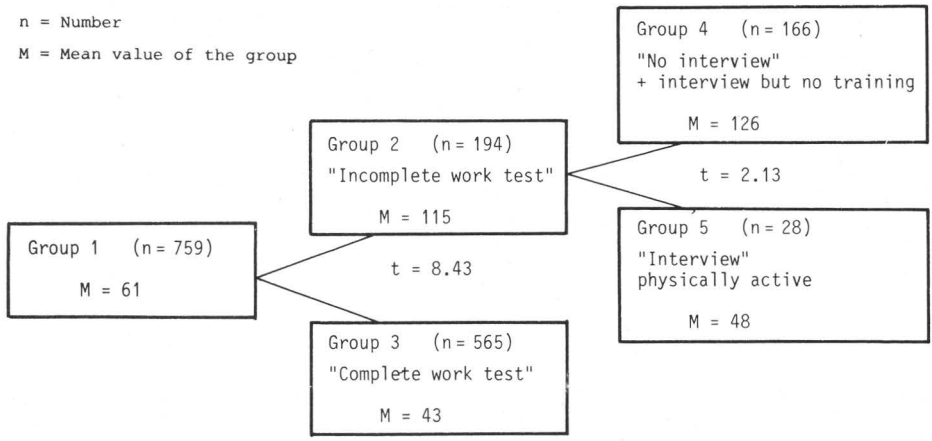

Fig. 2. AID analysis of the total number of absence days reported sick, for 1970–75, salaried employees. *n* = number, M = mean value of the group.

reasons, or participated in the interview and carried out the work test but were taking medication that affected heart rate.

Of the 759 salaried employees, 166 did not participate at all in the investigation, or only participated in the interview, during which they said that they did not indulge in any physical exercise. These formed a high-risk group whose mean absence was almost three times that of the others (Fig. 2).

Risk factors and absence days reported sick

The five risk factors that we have included are presented and defined in Table III. Paired *t*-tests are shown in Tables IV–VII.

It is evident in Table IV, where risk factors and absences are correlated, that little or complete absence of physical activity among salaried employees yielded a significantly higher rate of absence. In most cases, however, the workers were not as susceptible to individual risk factors as were the salaried employees, and in one case, workers and salaried employees showed opposite tendencies. Workers with low figures for physical condition had fewer absences than had workers with high figures, whereas the contrary was found among salaried employees. The salaried employees with high blood pressure had fewer absences, but no difference was found among the workers.

To obtain a better basis for analysis, certain combinations of risk factors were correlated with sick days. Table V shows the two risk factors that, in combination with physical condition, affect absenteeism.

Both workers and salaried employees who do not train regularly and are either over- or underweight, are more often absent. If, among the salaried em-

Table III. *Definitions of risk factors*

Designation	Variables	Definition
F1	Smoking	Smokes more than 0 cig/day
F2	Weight	More than: LBM + 20% (men), LBM + 35% (women) or less than LBM as calculated anthropometrically
F3	Blood pressure	Systolic blood pressure >160
F4	Physical training	Occasional or not at all
F5	Physical condition figures	Men: <87 (mean) Women: <73 (mean)

Table IV. *Average number of absence days reported sick for 1974–75, divided among groups with individual risk factors*

	F 1		F 2		F 3		F 4		F 5		
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Workers	26	24	26	24	25	25	25	25	22	29	Days absent (mean)
	40	35	37	38	33	39	38	33	33	41	Standard deviation
	154	198	199	153	111	241	317	35	197	155	Number of individuals
Salaried employees	20	16	19	16	14	19	19*	11	20	15	Days absent (mean)
	31	33	37	25	22	35	34	19	32	32	Standard deviation
	215	358	314	259	142	431	459	114	284	289	Number of individuals

* $p<0.02$.

ployees, those who have all three risk factors are compared with those who lack all three, the rate of absence of those with the risk factors is three times that of those without. When the same comparison is made with the workers, this difference is not found. The risk factor of the physical condition figures in Table V seems to have the same effect as in Table IV for the workers, where it appeared as an individual risk factor. Those who have "acceptable" condition figures but do not train and whose weight is in the risk zone have 30 absence days compared with the 8 days of those whose condition figures were not acceptable but who lack the risk factors of weight and training.

When the breakdown is continued as shown in Table VI with regard to all five risk factors, it becomes too difficult to interpret the results accurately. The condition figures affect the two working categories in different ways (Table VI). Poor physical condition among the salaried employees yielded an increased rate of absence, whereas similar low condition figures for workers show high absenteeism only when combined with all the other risk factors.

The next risk factors examined included smoking (F1), weight (F2) and physical training (F4).

The risk factor blood pressure is discussed in a separate article. When assessing risk factors individually, as shown in Table IV, smoking, weight, blood pressure and physical training had little effect upon the workers. For the salaried employees, the differences were more noticeable between those with and those without the risk factors. Physical training gave the greatest effect, with a 73% higher rate of absence in the encumbered group. When we combine the risk factors with each other according to Table VII, we find that the combinations where physical training is included show the greatest effect among both salaried employees and workers.

All the combinations given in Table VII show a definitely increased rate of absence for subjects with risk factors, where the combinations in Table VI, including blood pressure and physical condition figures, do not have this consistency.

Table V. *Average number of absence days reported sick for 1974–75, divided among groups encumbered with different combinations of risk factors*

	Have F2+F4		Do not have F2+F4		
	Have F5	Do not have F5	Have F5	Do not have F5	
Workers	21	30	8	17	Days absent (mean)
	29	43	8	34	Standard deviation
	96	86	5	13	Number of individuals
Salaried employees	22	18	13	7	Days absent (mean)
	38	41	13	9	Standard deviation
	141	117	15	43	Number of individuals

Table VI. *Average number of absence days reported sick for 1974–75 divided among groups encumbered with different combinations of risk factors*

	F1+F2+F4+F5				F1+F2+F3+F4				
	Yes		No		Yes		No		
	Not F3	F3	Not F3	F3	Not F5	F5	Not F5	F5	
Workers	18	32	24	6	18	32	23	10	Days absent (mean)
	20	48	42	8	28	48	42	7	Standard deviation
	33	12	8	3	7	12	8	4	No. of individuals
Salaried	35	14	6	3	4*	14	6*	15	Days absent (mean)
employees	47	14	7	5	3	14	7	14	Standard deviation
	40	13	24	8	12	13	24	7	No. of individuals

* $p<0.05$.

DISCUSSION

The number of absence days reported sick was three times as high in the drop-out group. This makes it more difficult to analyse accurately the importance of individual risk factors as related to absenteeism. In this case, this relationship could be underestimated. The fact that so many of the people with the highest rate of absence did not participate in the interview and the work test shows how difficult it is to reach these people in attempt to educate them about health habits.

Some of them were on the sick list during the time we carried out the investigation and were therefore not available. Others could not be convinced to participate. This shows the importance of special visiting activities regarding the chronically ill, and the significance of an effective program to help those who need help, but may not seek it. If they have sought help, they are motivated and should be encouraged to learn better health habits. It is reasonable to believe that in the long run this will yield an improved state of health and a lower rate of absence (1, 2, 3, 8). It is interesting to note that the drop-out rate is clearly greatest among male workers.

In this study a low degree of physical training is the sole risk factor which showed a significant difference in the absence among salaried employees. If this risk factor is combined with the weight risk factor, the rate of absence also increases for the workers. A look at some combinations shows that it is the combinations of other factors with the physical training risk factor that have the greatest effects.

The risk factor physical condition figures (physical ability to work) have different effects on workers and salaried employees. More workers than salaried employees have active or physically strenuous jobs, but considerably fewer undertake regular physical activities during their spare time. This suggests that physical condition figures for workers are influenced to a greater degree than for salaried employees by the physical demand of their work. This tendency regarding the workers

Table VII. *Average number of absence days reported sick 1974–75, divided among groups encumbered with different combinations of risk factors*

	F1+F2		F1+F4		F2+F4		
	Yes	No	Yes	No	Yes	No	
Workers	25	21	30	19	25	19	Days absent (mean)
	40	35	44	34	34	34	Standard deviation
	79	78	60	12	61	12	No. of individuals
Salaried	21	14	20*	8	20	8	Days absent (mean)
employees	33	22	30	10	48	10	Standard deviation
	107	151	76	31	108	31	No. of individuals

* $p<0.05$.

could possibly indicate that it is the physical training during their leisure time and not the physical condition that is most important from a health point of view (11).

The relationship between the different risk factors and the absence days reported sick shows that the only factor which individually correlates with an increased rate of absence is "low degree of physical training during spare time". The combinations that show the same connection for both workers and salaried employees are: over/underweight with low degree of physical training and smoking with low degree of physical training.

CONCLUSIONS

This was a complete investigation of employees in a special industrial field survey, and the observed differences between the sub-groups are factual. The design of this study as a cross-section investigation limits its use to assessing the current degree of correlation between different risk factors and absenteeism. We cannot, then, predict future illness on the basis of these findings.

The results lead us to the following conclusions:

- The number of absence days reported sick for the group who did not participate in the interview and measurement part of the investigation is markedly larger than for the participants. The fact that this group dropped out of the investigation implies high risk and a need for preventive programs.
- The specific risk factor that shows the strongest connection with a high rate of absence days reported sick is a low degree of physical activity during leisure time.

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II

Corporate reported sick leave and its relationship with education, responsibility and blood pressure

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Scand J Soc Med 12: 171–176, 1984

Corporate Reported Sick Leave and its Relationship with Education, Responsibility and Blood Pressure

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ABSTRACT

Corporate reported sick leave and its relationship with education, responsibility and blood pressure. Malmgren, S. and Andersson, G. (Department of Psychiatry, Preventive and Social Medicine, University Hospital, Linköping, Sweden).

Scand J Soc Med 1984, 4 (171–176).

The investigation group included all 1313 employees of SAAB-SCANIA, Linköping, in the age group 50–59 years. In 1975 they were called during their working hours to the company's Physical Training Centre to be assessed. This investigation included measurements such as systolic blood pressure, height, weight and certain anthropometric measurements. Other information was obtained from the personnel records about sex, age, type of employment, educational grade, degree of responsibility, and reported sick leave in 1974 and 1975 for the workers, and between 1970 and 1975 for the salaried employees. The total number of drop-outs was 238, or 18%. Sick leave is mainly a problem of the long-term absence of a minority of employees with an ever-increasing rate of absence. Sick leave among the salaried employees decreases in relation to higher education and increased responsibility. A high level of responsibility and education characterizes a low-risk group, whereas little responsibility and a low level of education denote a high-risk group with regard to blood pressure and sick leave. A disparity—low education and medium responsibility—has earlier been described as denoting a high risk of psychosomatic diseases. In this study they showed a rate of absence lower than the average at the same time as the blood pressure is above the average.

BACKGROUND

Today's highly industrialized society, with its ever-developing technology and its improved standard of living, has created an environment and a way of life which has not always resulted in better health. In the past few decades, absence due to sickness in Sweden has increased, the annual figure for 1976 being 23 days per individual (11). This was the highest known number of days per individual reported sick in the world.

The statistics on absenteeism do not, however, give a true picture of the state of health of the Swedish population. In addition to the general state of health, the statistics probably also reflect changes in social insurances and altered norms. Short-term absence reflects not only illness, but also conflicts and problems at work or at home (7, 16). On the other hand many people go to their work in spite of feeling far from well (2). Many people are also only partially capable of working and they have generally lower capacity limits (4). Furthermore, 40% of the population between 16 and 74 years of age suffer from some kind of lingering illness (13).

Sick leave is also related to education and responsibility. A low level of education, for example, is correlated to increased risk of cardiovascular deseases or high blood pressure (5, 1).

The purpose of this investigation was to study the pattern of the absence days reported sick in a population of older industrial employees and its variation with blood pressure, education and responsibility at work.

MATERIAL AND METHODS

The whole group in this investigation is presented in Table I. In 1975 everyone in the investigation group was called during his/her working hours to the Company's Physical Training Centre to be interviewed and measured (9). Information was obtained from the personnel records about sex, age and type of employment.

For the workers, the number of days reported sick in 1974 and 1975 was included, and for the salaried employees the number of days reported sick bewteen 1970 and 1975, as well as the educational grade and degree of responsibility. When rating the level of responsibility, the two main criteria used were work function and degree of difficulty (12). For the workers, only the number of working days on which he/she could have reported sick were accounted for (max. 269 days/year). The absence days

Table I. *All employees of the Aerospace Division of Saab-Scania AB, Linköping, Sweden, in the age group 50–59 years*

	Men	Women	Total
Workers	94%	6%	42%
	512	33	545
Salaried employees	90%	10%	58%
	691	77	768
Total	91%	9%	100%
	1 203	110	n=1 313

reported sick for the salaried employees, on the other hand, included all the days in the year with the exception of holidays (max. 334 days).

The measurements taken included systolic blood pressure, height, weight and certain anthropometric measurements. The blood pressure was taken after about 10 minutes in the sitting position.

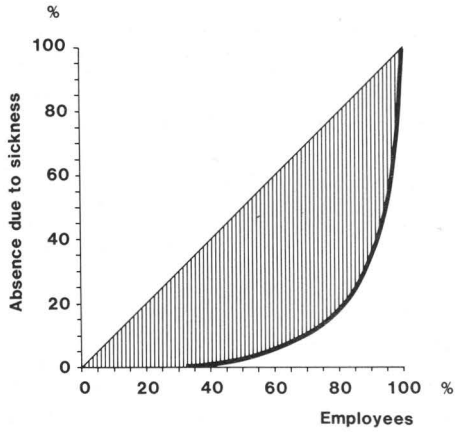

Fig. 1. Distribution of total absence days reported sick in 1975, salaried employees (N=768), Lorenz graph.

DROP-OUTS

In order to gain some notion of the systematic error caused by earlier drop-out, due to death, early retirement or disability pensioning, a retrospective comparison between salaried employees and workers between the ages of 50 and 59 for the years 1964–1975 was undertaken. This comparison shows that more workers than salaried employees had died and that considerably more had been awarded a disability pension or had gone into early retirement (Table II). Those of the investigation group who, despite personal contact, failed to appear, are distributed as shown in Table III.

The material has been computer-processed with the program package SPSS (10) and OSIRIS (15).

RESULTS

The absence of salaried emplyees measured by mean absence days reported sick per employee increased by 114% during the period 1972–75. The mean increase for the workers during the period 1974–1975 was 8% (Table IV).

The distribution of the overall absenteeism during each year was most uneven. The Lorenz graph for 1975 illustrates a typical year's distribution (Fig. 1).

Fig. 1 shows that for salaried employees 32% (242) had no absences at all, 70% (537) accounted for only 10% of the absences during the year and 5% (39) accounted for 50% of the absences. The distribution of the overall absence for the same year for the workers is similar.

For the workers in 1975 31% (169) had no absences at all, 68% (370) accounted for only 10% of the absences and 5% (27) accounted for 50% of the absences. As regards individuals, the number of sick leave days appears to be fairly constant when viewed over longer periods. The uneven distribution is then not as pronounced as the one-year statistics show, but is still considerable. The distribution of overall absence for salaried employees between 1970 and 1975 is as follows: 12% (92) had no absences at all, 52% (389) accounted for only 10% of the absences and 10% (77) accounted for 50% of the absences.

To illustrate how much of the increase in sick leave in both the groups was caused by a minority registering an ever-increasing amount of absence, Tables V and VI were compiled.

Table II. *Number of workers and salaried employees either deceased, with early retirement pension or disability pension, 1964–75 (retrospective drop-out)*

	Salaried employees	Workers
Deceased	25 (3%)	31 (5%)
Early retirement or disability pension	7 (1%)	29 (5%)
Investigation group	768 (96%)	545 (90%)

Table III. *Drop-out reasons for non-participation*

	Workers		Salaried employees		
	Men	Women	Men	Women	Total
Declined because of physical handicap	53	2	30	3	88
Declined for other reasons	62	2	35	4	103
Reported sick	24	–	20	2	46
Deceased	–	–	1	–	1
Total drop-outs	139	4	86	9	238
Percentage drop-outs	27	12	12	12	18.1

The proportion of the absence that can be attributed to 10% of the employees increases disproportionately with overall absences. (The more absence days that are reported totally, the greater will be the relative part comprising these 10% who are ill the most.)

In the salaried category, 10% of the employees were responsible for 67% of the sick leave days in 1975, 7873 days. A comparison will show that this figure is greater than the total amount accounted for in 1973. However, the total number of absence days for 10% of the salaried employees almost doubled from 1970 to 1975 and increased by 119% between 1972 and 1975.

The workers' distribution is similar and increased at the same rate as the development of the absence. As the total number of absence days increased by 8%, this 10% of the group increased their share of the absence by 8%. This means that this group increased its absence by 23% (1416 days).

Further proof that the increase in absence can be attributed to a relatively small number of persons emerges when the development of absence is investigated to find those persons who in 1975 had more than 90 absence days. From Fig. 2 it appears that those who become '90-day cases' had had a high mean rate of absence days per employee for 5 years prior to the investigation. Between 1970 and 1974, some 50 to 68% of all in this group had a sick absence rate higher than the average for the whole group.

There is no grading of education or level of responsibility for the workers. The absence days reported sick for the salaried employees decreased significantly in tact with improving education rises, and also decreased as level of responsibility rose ($p<0.05$). Since education and responsibility seem to be correlated, it is of interest to study the distribution of absence days reported sick when both these variables are considered (Table VII).

Among employees with education classified as 'medium', we found a trend toward a decrease in sick leave related to higher level of responsibility. This is not true of those with a low level of education who have the lowest rate of absence in the medium responsibility category.

Table IV. *Development of average sick leave, 1970–75 (mean number of days/employee)*

Year	Workers	Salaried employees
1970	No information	8.5
1971	No information	7.2
1972	No information	7.1
1973	No information	10.1
1974	19.9	12.2
1975	21.4	15.3

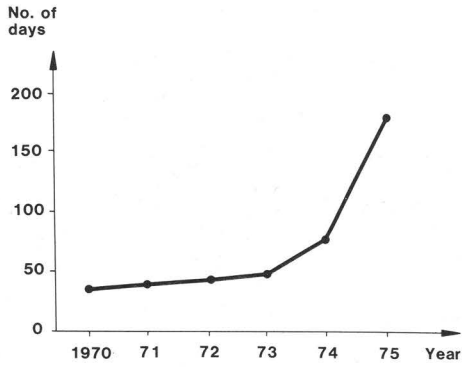

Fig. 2. Mean number of absence days reported sick per employee for 1970–75. Salaried employees, 1975's "90-day cases" ($N=28$).

Table V. *Absence days reported sick for the 10% of the salaried employees who in the year in question had the highest amount of absence (N=768)*

Absence days reported sick	1970	1971	1972	1973	1974	1975
All employees						
Days/employee (mean)	8.5	7.2	7.1	10.1	12.2	15.3
Total no. of days	6 504	5 606	5 504	7 785	9 358	11 752
The 10% most absent						
Perentage of total no. of days	62%	60%	60%	62%	65%	67%
No. of days	4 032	3 363	3 302	4 826	6 082	7 873

Among the workers, high blood pressure was not related to absenteeism, but the salaried employees with high blood pressure appear to have a lower rate of absenteeism. This relationship in the salaried group is analysed further in Table VIII, which compares blood pressure between groups with different levels of education and responsibility. The same increase is evident in both Tables VII (absences) and VIII (blood pressure) as the levels of education and responsibility decline.

Fig. 3 shows that the only combination which shows a lower than average sick leave absence with higher than average blood pressure is low level of education and medium level of responsibility. A previous observation for the salaried employees (that high blood pressure is connected with a lower rate of absence), applies only to this combination. A similar tendency can be found in the combination medium level of education with high level of responsibility.

DISCUSSION

Although half of the overall absence can be attributed to only 5% of the employees in both groups, an accurate comparison betwen the workers and salaried employees cannot be made. It is undeniably important to note that in the retrospective drop-out, 5% of the workers had been awarded a disability or early retirement pension, whereas only 1% of the salaried group fall into this category. The comparison of the present situation between workers and salaried employees does not, therefore, give a complete picture of the dynamics of sick leave reporting. Salaried employees with the highest rate of sick leave reporting in 1975 had already shown a higher than average rate of absence for the period 1970–74. In addition, there was a rapid increase in the number of longterm absences due to sickness during the year 1974–1975.

If the overall amount of sick leave in the age group investigated is to be noticeably affected, it is clear that effective preventive measures must be directed towards those employees who run an increased risk of an accelerating high rate of absence.

Generally speaking, the workers have duties with a lesser degree of responsibility and greater super-

Table VI. *Absence days reported sick for the 10% of the workers who in the year in question had the highest amount of absence (N=545)*

Absence days reported sick	1974	1975
All employees		
Days/employee (mean)	19.9	21.4
Total no. of days	10 846	11 676
The 10% most absent		
Percentage of total no. of days	58%	66%
No. of days	6 290	7 706

Table VII. *Mean numbers of absence days reported sick per employee for 1974 and 1975, distributed among groups with different combinations of education–responsibility; salaried employees*

Level of education: Low = elementary school, Medium = secondary school, High = university. Level of responsibility: High = 2–4, Medium = 5, Low = 6–8.

Level of education	Level of responsibility			
	High	Medium	Low	Total
Low	32 (27)	23 (91)	38 (140)	32 (258)
Medium	22 (195)	30 (175)	40 (58)	28 (428)
High	13 (67)	2 (5)	4 (1)	12 (73)
Total	21 (289)	27 (271)	38 (199)	M=28 n=759

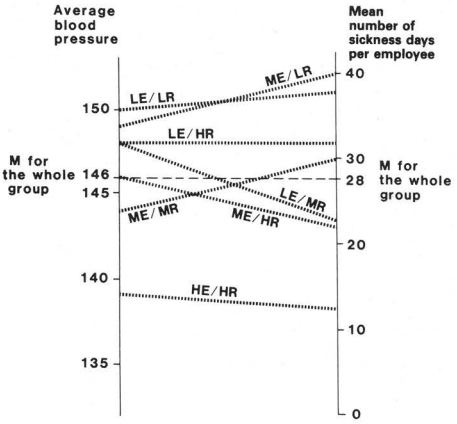

Fig. 3. Comparison of the intervariation of the blood pressure with different combinations of level of education and level of responsibility, with absence days reported sick values for these combinations; salaried employees. Level of education: LE = low. ME = medium. HE = high. Level of responsibility: LR = low. MR = medium. HR = high.

vision than is the case with the salaried employees. A special analysis of salaried employees shows that drop-out is fairly evenly distributed over the different levels of education. It is interesting to note that, with regard to the level of responsibility, the drop-out rate is greater in the category which is closest to the worker's category (level of responsibility 6–8).

The risk factor analysis group of salaried employees is consequently rather unevenly distributed. This can also be said to apply to the entire risk factor analysis group, as the drop-out was greatest among the workers.

When we analyse salaried employees in greater detail with regard to the level of their education and the amount of responsibility that their positions entail, we find that there is only one group—those with a higher level of responsibility than education—that shows high blood pressure in combination with a low rate of absenteeism. Most of the employees in this category are ambitious and their duties involve increased responsibility, but these duties are at such a low level that the employee's influence is limited. This combination of personality and responsibility seems to increase the occurrence of high systolic blood pressure (6).

As stress can be considered to have certain considerable effects on blood pressure (8, 14), a logical

Table VIII. *Mean systolic blood pressure per employee, divided into groups with different combinations of level of education–level of responsibility; salaried employees*

Level of education: Low = elementary school, Medium = secondary school, High = university. Level of responsibility: High = 2–4, Medium = 5, Low = 6–8

Level of education	Level of responsibility			
	High	Medium	Low	Total
Low	148 (24)	148 (85)	150 (117)	149 (226)
Medium	146 (175)	144 (152)	148 (48)	145 (375)
High	138 (59)	140 (3)	145 (1)	138 (63)
Total	144 (258)	145 (249)	149 (166)	M=146 n=664

interpretation would be that people with a high degree of ambition (type A behaviour) (3) stress themselves. Their ambition often causes them to ignore their body's warning signals, and stress continues to mount as they work as usual. If this is the case, the combination of high blood pressure and low rate of absence should mean that there is greater risk of future illness (16). The relationship found between high blood pressure and low rate of absence shows the inaccuracy of judging people's state of health from the absence figures.

CONCLUSIONS

The findings of this total investigation are factual, based on observed differences between described sub-groups between the ages of 50 and 59.

The results allow the following conclusions to be drawn:

- The reported sick leave in this age group is mainly a problem of long-term absence of a minority of employees and increasing absenteeism among this same minority.
- Workers have a higher rate of retrospective drop-out due to disability and earlier retirement pensioning. The workers also have more absenteeism than the salaried employees.
- It has been discovered that rate of absence declines as the levels of education and responsibility rise, among salaried employees.
- Only one combination of level of education and level of responsibility (low level of education and medium level of responsibility) shows a lower

than average rate of absenteeism, while blood pressure is higher than average. There is a need for closer study of this group of employees.

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III

Who were reached by and participated in a one year newspaper health information campaign

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Scand J Soc Med 14: 133–140, 1986

Who Were Reached by and Participated in a One Year Newspaper Health Information Campaign?

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Who were reached by and participated in a one year newspaper health information campaign? Malmgren, S. and Andersson, G. (Department of Preventive and Social Medicine, University Hospital, Linköping, Sweden).
Scand J Soc Med 1986, 3 (133–140).

In 1977–1978 the newspaper Östgöta Correspondenten (Corren) had a one year campaign for better health. The campaign was called "Piggare med Corren" (Get fit with the Corren) and included anti-smoking, dietary and exercise components. It was given great publicity in the newspaper. The purposes of this investigation were to examine the changes in dietary, exercise and smoking habits of the registered participants, the effects on well-being related to those changes, and to determine the effects of the campaign on the whole population of the city of Linköping. This article focuses upon questionnaire response, dropout and participation. Information on the registrants was collected by registration forms, monthly reports, fitness tests and questionnaires. 62% answered the questionnaire. Those who did not return the questionnaire were also studied. Most of the people in Linköping knew of the campaign, but only a small number registered (2.5%). There was greater response among women between the ages of 30–49; and less among those who had poor dietary, exercise or smoking habits. Most inclined to answer the questionnaires were those who had comparatively better exercise and smoking habits before the campaign. This group also improved their exercise habits and capacities for absorbing oxygen (VO_2 max).

BACKGROUND

Within the last 15 years health information has been made available in Sweden, with hopes of improving dietary, exercise and smoking habits among the inhabitants. The majority of middle-aged men (90%) believe that exercise is important for their health and well-being, but only about 15% practise some kind of physical training (2). There has not been an increase in the number of people exercising, but a change in the level at which they train (13). It seems as though the extensive efforts have initiated few behavioral changes even though the main content of the health message seems to have been accepted.

In 1977 the newspaper Östgöta Correspondenten (Corren) initiated a one year campaign to improve dietary, smoking and exercise habits of the people in Linköping and Motala (8). The campaign, "Piggare med Corren" was given very large space in the newspaper with special supplements every week. Among other things about ten informational meetings were arranged in Linköping with specialists from the regional hospital, the Saab-Scania Physical Fitness Centre and Linköping University and readers' questions were answered in the newspaper. Cooperation was established locally with the sports and outdoor organisations for forming about twenty new exercise groups in Linköping. Company teams were formed, and competitions between different places of work.

There has probably never been a more intensive newspaper campaign to increase people's awareness of their health in Sweden.

We have chosen to study Östgöta Correspondenten's campaign for improving dietary, exercise and smoking habits of the inhabitants of Linköping and surrounding communities in two separate investigations.

The first investigation will examine the changes in the registrants' habits, and the effects those changes had on well being.

The second investigation focuses upon the entire population of Linköping; attention given to the campaign, the changes in people's attitudes, knowledge gained and behavioral changes.

PURPOSE

The purpose with the article is to study, in a comparative analysis of the two investigations, partly how many and who were reached by and persistent-

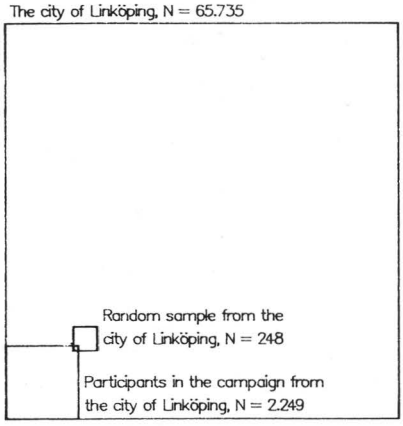

Fig. 1. The population, the registrants in the campaign and the random sample from the city of Linköping.

ly participated in the campaign, partly report and discuss drop-outs and questionnaire responses.

INVESTIGATION 1: PARTICIPANTS IN THE CAMPAIGN

Method

The campaign started in April 1977 and ended in March 1978. Participants in the campaign registered voluntarily. Information on the participants was collected from: registration forms, monthly reports, fitness evaluations, and questionnaires.

Registration forms

2887 persons registered voluntarily from Jan. to April 1977 for the campaign. The mean age of the registered participants was 40.4 years. 67% of the registered persons were women and 33% men. The registration forms included age, sex and profession.

Monthly reports

The registrants sent monthly reports during the campaign to the newspaper with information about their exercise, weight and smoking changes. 1622 persons (56%) of the 2887 registered for the campaign sent in monthly reports at least once. 199 (7%) sent in all 12 monthly reports.

Fitness test

1212 of the 2887 registrants expressed an interest in participating in the fitness test at the Saab-Scania Physical Fitness Centre in Linköping. All 1212 were called, with 844 persons (70%) participating in the first test in March to May 1977. These 844 persons were called again in one year as a follow-up. 255 persons participated in the second test in April 1978.

The fitness test included interviews, measurements and work tests on the bicycle ergometer. The interview covered some risk factors such as work situation, smoking and exercise habits. The measurements taken included systolic blood pressure, height, weight and certain skeletal measurements. The exercise tests were performed on mechanically braked bicycle ergometers (16). The maximum capacity for absorbing oxygen (VO_2 max) was estimated from the working pulse and the load using a nomogram (15).

Questionnaire

The questionnaire was sent in April 1978 to:

A) all registrants participating in the first fitness test, 844 persons;

B) all registrants participating in the quit smoking part of the campaign, 418 persons;

C) all registrants who have sent at least 10 monthly reports, 433 persons;

D) all registrants who sent in one or more of the last three months' reports, and do not fit in one of the categories A, B or C, 220 persons.

935 persons (60%) of 1568 registrants who received the questionnaire returned it.

All the information obtained was data processed. Significance was determined using Fisher's test and *t*-tests.

Drop-outs

The highest drop-out rate (61%) was among the registrants participating in the anti-smoking part of the campaign. The group who sent in most of their monthly reports tended to have higher response to the questionnaire.

The drop-out for combinations of the different groups of registrants is shown in Fig. 3.

The combination that contains the greatest number of persons who answered the questionnaire were those who took part in the fitness test and sent 10–12 monthly reports.

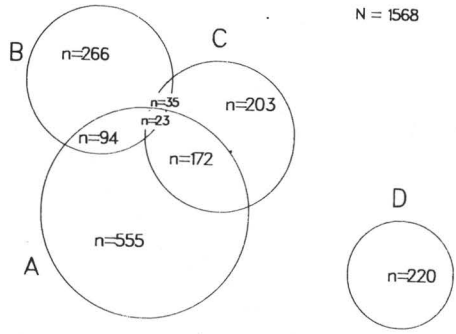

Fig. 2. Target group for questionnaire to registrants in the campaign. (*A*) participating in fitness test (n=844), (*B*) participating in quit smoking (n=418), (*C*) who sent in 10–12 monthly reports (n=433), (*D*) who sent their monthly reports at least one of the last three months of the campaign and do not fit in one of the categories *A*, *B* or *C* (n=220).

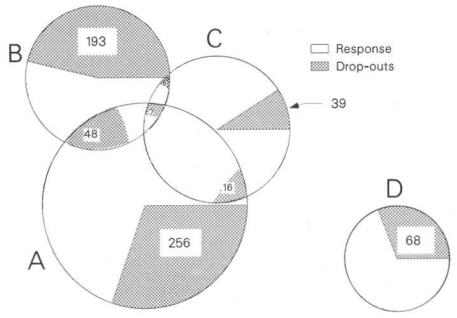

Fig. 3. Questionnaire response arranged by group (N=1 568). (*A*) participating in fitness test (n=844), (*B*) participating in quit smoking (n=418), (*C*) who sent in 10–12 monthly reports (n=433), (*D*) who sent their monthly reports at least one of the last three months of the campaign and do not fit in one of the categories *A*, *B* or *C* (n=220).

Result

The registrants in the campaign

There were 2 887 participants registered in the campaign. 2 249 of those persons were living in Linköping (78%). The distribution of the *Östgöta Correspondenten* is the largest in Linköping. 2.5% of those readers registered for "Piggare med Corren". 4.8% of the newspaper's readers in Norrköping registered for the campaign. This, however was only 57 participants.

In Mjölby-Skänninge we find the greatest number of persons who sent 10 monthly reports or more. 149 of the 269 registered participants from Motala–Vadstena (55%) did not send in any reports.

Clearly more women registered than men, and registration was greater in the 30–39 and 40–49 year old groups. This misrepresentation is shown in Fig. 4. 131 registrants did not report their sex or age.

Questionnaire response, dropout and participation

Slightly more than half of the registrants who did not answer the questionnaire (52%) participated in the first fitness test. This makes it possible to study the non-response and drop-out problems by an analysis of the results from both the tests. A model of this analysis is presented in Fig. 5 and the results of the tests in Tables I–V.

In the following comparisons, questionnaire response (comparisons 1, 2 and 3), dropout (comparison 4) and participation (comparison 5) are studied.

Significance was determined using Fisher's test, t-tests between groups with two-tailed probability and t-tests between variables using paired samples.

1. In comparing A + B to C + D differences in starting values for those who answered and those who did not answer the questionnaire can be seen. The comparison shows that the group that did not answer the questionnaire contains more non-exercisers ($p<0.01$) and more smokers ($p<0.01$).

2. In the comparison between B and D the initial values are analysed for those who were motivated enough to come back for the second test. Even in this highly motivated group we find that the group

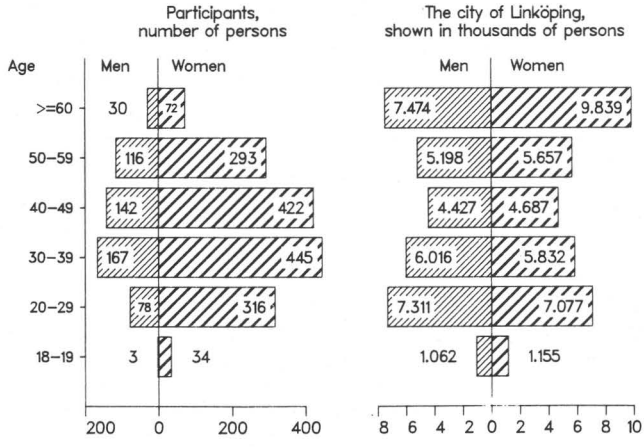

Fig. 4. The distribution of sex and age of the registered participants in Linköping (N=2 249). The city of Linköping (N=65 735). Missing values = 131.

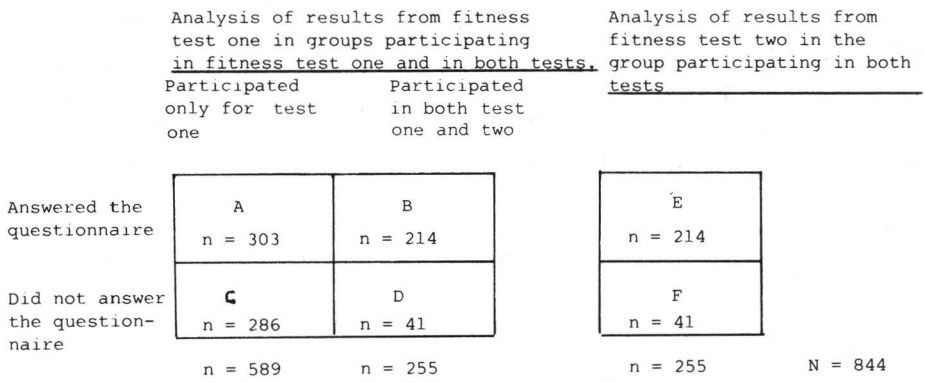

Fig. 5. Model for analysis of the results of the fitness tests.

that did not answer the questionnaire contained more smokers ($p<0.05$) and non-exercisers (not sign).

3. The changes from B to E are compared to the changes from D to F. This analysis shows if there is any difference from test one to test two between the groups who had answered respectively had not answered the questionnaire. The results show that very few of the persons returning to the second test did not answer the questionnaire, and also show that both groups had positive changes, with regard to exercise and smoking habits. Non-exercisers decreased from 19% to 4% and smokers from 19% to 10% in the group answering the questionnaire. The corresponding figures among those who did not answer the questionnaire are 27% to 17% for non-exercisers and 34% to 22% for smokers. The difference in improvement in these two groups however is not singificant. While comparing these groups we also find a significant decrease in weight ($p<0.01$) and a significant increase in predicted VO_2 max ($p<0.05$) in the group that answered the questionnaire; whereas no improvements were found among those who did not answer the questionnaire.

4. Those who came for just the first test (A + C), is compared to those who came for both tests (B + D), and illustrates the problem of dropout. When the starting points of these two groups are compared, we can see that those who did not come back a second time contained more non-exercisers ($p<0.01$), more smokers ($p<0.05$) and the mean age was lower ($p<0.01$). Predicted VO_2 max was also significantly higher in B + D ($p<0.05$).

5. The comparison between B and C illustrates

Table I. *Results of fitness test one for participants in test one who answered and who did not answer the questionnaire (comparison 1)*

Medicine consumption = medicine affecting the cardiovascular system, No exercise = never does any physical activity, Smoker = smokes more than 0 cigarettes per dag, Stressed = feels stressed often or very often, VO_2 max = predicted maximal oxygen absorbing capacity calculated from a submaximal work test on an ergocycle

	Women (%)	Birth year (mean)	Weight (mean)	Medicine consumption (%)	No exercise (%)	Smoker (%)	Stressed (%)	VO_2 max (mean)	Number of persons
All participants in test one, and answering the questionnaire (A + B)	No inform.	1934	70	8	25	21	24	2.5	517
All participants in test one, but did not answer the questionnaire (C + D)	No inform.	1935	72	8	38	33	24	2.5	327

Table II. *Results of fitness test one for participants in both test one and two who answered and did not answer the questionnaire (comparison 2)*

	Women (%)	Birth year (mean)	Weight (mean)	Medicine consumption (%)	No exercise (%)	Smoker (%)	Stressed (%)	VO_2 max (mean)	Number of persons
Both test one and two and answering the questionnaire (B)	62	1931	70	8	19	19	21	2.6	214
Both test one and two but did not answer the questionnaire (D)	47	1934	69	7	27	34	27	2.7	41

Table III. *Results of fitness test one and two for participants in both test one and two who answered and did not answer the questionnaire (comparison 3)*

	Women (%)	Birth year (mean)	Weight (mean)	Medicine consumption (%)	No exercise (%)	Smoker (%)	Stressed (%)	VO_2 max (mean)	Number of persons
Results of test one									
Both test one and two and answering the questionnaire (B)	62	1931	70	8	19	19	21	2.6	214
Both test one and two but did not answer the questionnaire (D)	47	1934	69	7	27	34	27	2.7	41
Results of test two									
Both test one and two and answering the questionnaire (E)	62	1931	69	7	4	10	19	2.7	214
Both test one and two but did not answer the questionnaire (F)	47	1934	69	7	17	22	24	2.7	41

Table IV. *Results of test one for all participants in test one and participants in both test one and two (comparison 4)*

	Women (%)	Birth year (mean)	Weight (mean)	Medicine consumption (%)	No exercise (%)	Smoker (%)	Stressed (%)	VO_2 max (mean)	Number of persons
Only test one (A + C)	73	1936	71	8	34	28	27	2.5	589
Both test one and two (B + D)	60	1932	70	8	20	21	22	2.6	255

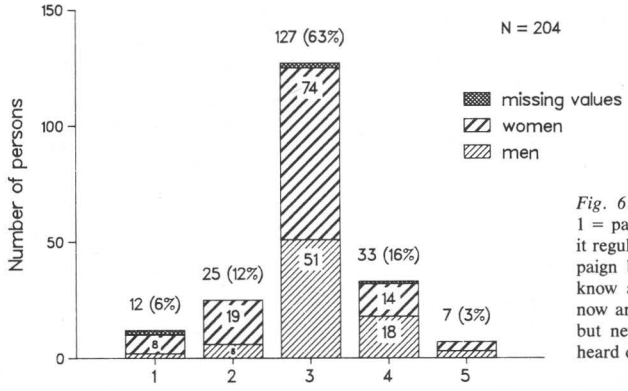

Fig. 6. Distribution of campaign awareness. 1 = participated in the campaign and followed it regularly, 2 = never participated in the campaign but followed it regularly anyway, 3 = know about the campaign and read about it now and then, 4 = know about the campaign but never read anything about it, 5 = never heard of the campaign.

the difference in the starting values for those who participated to the greatest respectively least extent with regard to both tests and questionnaires. The analysis shows that the group who participated least consisted of more non-exercisers ($p<0.01$) and smokers ($p<0.001$). The average age was also lower ($p<0.01$).

INVESTIGATION 2: RANDOM SAMPLE

Method

Sample. The sampling has been carried out by the County Administration Data Section. The population is defined as inhabitants of the city of Linköping over the age of 17. There are 65 735 persons in this group, and a random sample of 248 was used for this study (Fig. 1).

Questionnaire. Information about this sample was obtained through a questionnaire. Of the 248 questionnaires distributed, 204 (82%) were returned or answered on the telephone. The information obtained from the questionnaires was computerized. Significance tests of the distributions were carried out using chi-square.

Non-responses. The 44 persons (18%) who did not return the questionnaires are distributed in Table VI with regard to reasons for non-response. The returned questionnaires were representative of the age of the population, but there was a slight underrepresentation of men.

Result

Fig. 6 represents the awareness of the participants regarding the campaign. The question asked was: "How much do you know about the campaign 'Piggare med Corren'?" Six percent of the sample participated in and followed the campaign regularly. There are no significant differences between the sexes, in spite of the fact that women said that they payed more attention to the campaign than the men. Clearly, awareness in the city was high, as only 3% said they had not heard of it. The majority only read about the campaign and 6% participated fully.

DISCUSSION

It was natural for us to choose the city of Linköping for our study since 83% of the household sub-

Table V. *Results of test one for participants in both test one and two who also answered the questionnaire and participants only in test one who did not answer the questionnaire (comparison 5)*

	Women (%)	Birth year (mean)	Weight (mean)	Medicine consumption (%)	No exercise (%)	Smoker (%)	Stressed (%)	VO_2 max (mean)	Number of persons
Both test one and two and answering the questionnaire (B)	62	1931	70	8	19	19	21	2.6	214
Only test one but did not answer the questionnaire (C)	No inform.	1936	72	8	40	33	28	2.5	286

Table VI. *Distributions of reasons for not returning the questionnaire*

Non-response reason	Number of persons
Not available	35
Refusal	6
Sick	2
Deceased	1
Total	44

scribed to the newspaper and 78% of the registrations came from there.

Methodologically, we combined a total study of those who appeared most interested and persistent as registrants in the campaign with a study of a random sample from the city of Linköping. This gave us the opportunity to examine in depth the health changes felt by the most actively engaged persons, and to investigate how many persons might have participated without showing it openly.

From the random study it can be seen that at least three quarters of the Linköping inhabitants above the age of 17 had read about the campaign, and that only a very small percentage did not know about it. In spite of this awareness only 6% said that they had participated. A 95% confidence interval in random sample yields such uncertainty that it is only possible to say that the number of participants can be as low as 2.6 percent, but it could be somewhat higher. Both studies thus show that the campaign reached the majority of the inhabitants of Linköping but that only a small part participated in and followed it regularly.

The group of participants contained more women than men and the age group 30–49 years was overrepresented. One explanation of this distribution of sex and age could be that the sports organizations in Sweden mainly involve men in younger age groups and the campaign have reached some of the groups that were least engaged in organized sports. Another possible explanation of the success among these target groups can also be that women in these ages are more frequently responsible for the household and are therefore more susceptible to food and diet propaganda.

The aim of the total study was to illustrate the experienced effects on those who had changed their dietary, exercise and smoking habits in a positive way as a result of the campaign. Therefore we looked for a group who had shown a permanent interest in health improvement. Smoking was an exception. We chose all the registered smokers. 61% of this group did not answer the questionnaire, the lowest response of any group. Closer examination of the smokers shows that 67% of those who did not send in 10–12 reports did not answer the questionnaire, while only 22% of those who did send in 10–12 reports did not answer the questionnaire. This poor questionnaire response is probably due to the fact that the majority of those who did not complete the monthly reports were not successful in their attempt to quit and did not wish to reveil this in a questionnaire. The lack of response from this group does not negatively affect the study since we want to study those who have succeeded in changing their behaviour.

79% of the group who returned at least 10 monthly reports responded to the questionnaire. We feel that throughout the study we have probably received responses from those who have been the most successful in improving their habits. This is reinforced by our analysis of the group of campaign registrants who went through the fitness test. The analysis comprises slightly more than half of those who did not answer the questionnaire. The results show that those who answered the questionnaire improved their capacity for absorbing oxygen (VO_2 max) to a greater extent than those who did not answer the questionnaire. The analysis also showed that this group contained fewer smokers and non-exercisers before the campaign began.

We find the same pattern in a comparison between those who went through one or both tests. Those who came back at the end of the campaign to complete a work test and discuss their success toward their goal of behavior modification initially had better exercise and smoking habits.

The most dedicated participants apparently had better health habits than the rest of the registrants. For obvious reasons they were also the most willing to discuss the results.

Thus with this drop-out analysis we have been able to show that those in our total study who answered the questionnaire are persistent participants in the campaign.

The process of behaviour change involves two distinct steps, initiation of the behaviour and adherence to the newly adopted behaviour (10).

Also this campaign seems to have followed an expected pattern for mass communication (6). The health information reached most of the population

but only a small segment registered and even fewer participated.

The fact that the initiation step did not function better might be that the campaign was a pure mass media campaign. The elements of lectures, group work and face to face interaction were of limited proportions and based on self-selection (9, 12, 14).

In spite of all the efforts to maintain the registrants' interest there were many who did not participate throughout the length of the campaign. Among those who initially had poor habits, fewer were successful in carrying through, with drop-out a difficult problem to master (1, 3, 4, 5, 7, 11).

CONCLUSIONS

The majority of the population of Linköping knew of and had read about the campaign but only a small minority registered and followed it regularly.

The campaign received the best response among women in the age group 30 to 49 years.

The most willing to tell about their participation in the campaign were those who had better smoking and exercising habits before it began. Most of this group started exercising more frequently and had improved their capacities for absorbing oxygen.

Many persons did not participate for the duration of the campaign. The largest number of drop-outs was among those with poorer exercise and smoking habits.

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IV

Occurrence of athletic injuries in voluntary participants in a 1-year extensive newspaper exercise campaign

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Occurrence of Athletic Injuries in Voluntary Participants in a 1-Year Extensive Newspaper Exercise Campaign

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Abstract

G. Andersson, S. Malmgren, and J. Ekstrand, Occurrence of Athletic Injuries in Voluntary Participants in a 1-Year Extensive Newspaper Exercise Campaign. Int J Sports Med, Vol 7, No 4, pp 222–225, 1986.

In 1977 the newspaper *Östgötacorrespondenten* (Corren) started a 1-year campaign for better health. The campaign was called "Piggare med Corren" (get fit with the Corren) and included antismoking, dietary, and exercise components. It was given widespread publicity in the newspaper.

The purpose of the study was to examine the extent of self-reported exercise injuries in volunteers who diligently participated in a newspaper campaign.

Information was collected from questionnaires sent to the most persistent participants after the campaign; 60% answered the questionnaire. An analysis of the dropouts showed that they had not started to exercise to the same extent as the others.

Only 5% said that they had not exercised before the campaign; 6.7% reported that they were injured in connection with their exercising during the campaign in such a way that they had to interrupt their exercise. Thirty-seven persons had called a doctor and 19 persons were reported sick during for an average of 1 month because of the exercise injuries.

There were significantly more regular exercisers who had been highly active before the campaign among those who had been injured compared with those who were not injured.

Key words: physical activity, athletic injuries, exercise campaign

Introduction

People of different ages, with different types of possibilities and talents, are participating in sports in the form of competition or exercise. More and more people are exercising in an organized and qualified way in sports clubs (17). Many people also have a positive attitude toward the importance of exercise for health and well-being (4).

Exercise offers many positive physiologic and medical effects, but also involves great risks for injuries. Of those who come to casualty wards with injuries, 6%–15% have been injured in connection with exercising (3, 9, 18).

There have been more studies of injuries due to competitive sports than of injuries due to exercise. Different studies of injuries among exercisers show varying frequencies of injuries (7, 8, 10, 12, 16). This can be due to differences in age, exercise forms, and intensity of exercising; also, the length of the period of the study and the way of defining and registering the injuries may show some differences. However, there are few studies on the extent of injuries of exercisers in connection with extensive newspaper exercise campaigns. It is important that studies of this kind are carried through since there have been extensive health campaigns going on in Sweden during the last 15 years, often in the form of campaigns with the aim of making people start exercising. The research on the effects of exercising has mainly been focused on the positive benefits. We think it is important also to throw light upon the negative effects of exercising in connection with extensive exercise campaigns. The purpose of the study was to examine the extent of self-reported exercise injuries in voluntary participants with persistent interest in a 1-year exercise campaign.

Material and Methods

In 1977–1978 the newspaper *Östgötacorrespondenten* (Corren) ran a 1-year campaign in Linköping for better health. The compaign was called "Piggare med Corren" (get fit with the Corren) and included exercise, dietary, and antismoking components. It was given great publicity in the newspaper with special supplements every week. Informative meetings were arranged monthly with specialists from the regional hospital, the Saab-Scania Physical Fitness Center, and Linköping University, and readers' questions were answered in the newspaper. Company teams were formed and competitions held between different places of work.

The participants sent in monthly reports during the campaign to the newspaper about the number of days of physical activity.

Questionnaires sent to the participants after the campaign made it possible to register the number of self-reported injuries in connection with exercising. It was important that the questionnaire reached the persons who participated in the campaign most diligently.

After the campaign the questionnaire was sent out in April 1978 to:

A. All participants in a fitness test (844 persons)
B. All participants in the "quit-smoking" part of the campaign (418 persons)
C. All participants who had sent a least ten monthly reports to the newspaper (433 persons)

D. All participants who had sent in one or more of the last 3 months' reports and did not fit into one of the other categories (220 persons)

Of 1568 participants who received the questionnaire, 935 persons (60%) returned it. The lowest response was among the participants in group B (39%) and the highest in groups C (84%) and D (70%), i.e., those who sent in most of their monthly reports and by doing so showed improvements in their health habits. The mean age of the participants was 40.4 years; 67% were women and 33% men.

An analysis of the dropouts showed that the registrants who had not answered the questionnaire had not started to exercise to the same extent as the others (11).

The questions in the questionnaire pertained to exercise habits before the campaign and number of different exercise activities before and during the campaign. There were also questions about exercise injuries which had posed an obstacle to continued exercise and had also resulted in calls to a doctor and sick leave. All the information obtained was data processed. Significance was determined using the chi-square test and t tests with two-tailed probability.

Results

Exercise Habits

Only 50 persons (5%) said that they had not exercised before the campaign; 44% exercised at least 1–2 times a week and the rest exercised occasionally. In this respect there was no difference between men and women, as was the case regarding change of exercise habits, which shows if the exercisers have started new different exercise activities or not: 43% of the women and 35% of the men ($P < 0.05$) had participated in more different exercise activities during the campaign than before; 6% of the women and 8% of the men had participated in less different exercise activities.

Exercise Injuries

Of those who answered the questionnaire, 63 persons (6.7%) reported that they had been injured in connection with their exercising during the campaign in such a way that they could not go on exercising; 18 persons had to discontinue exercise for more than 1 month. Of the 63 injured persons, 26 were men (8.3% of the men who answered the questionnaire) with a mean age of 34.6 years and 37 women (5.9%) with a mean age of 39.4 years.

As a result of the exercise injuries, 37 persons had consulted a doctor with for an average of two calls. One person said that due to the injury he had to stay in a hospital for 1 week. In all, 19 persons were reported sick during for an average of 1 month because of exercise injuries, three of whom were reported sick for more than 1 month.

Regarding the part of the body injured the most, injuries to the lower legs predominated, namely, 64% of all injuries (Table 1). Only five persons answered that the injuries resulted from body contact.

Exercise Injuries – Exercise Habits

In Table 2 the exercise habits are compared before the start of the campaign for the 63 injured persons with those who had not been injured. Table 2 shows that the greatest difference between the groups is to be found among those who exercised 3–5 times a week before the campaign where 15% were injured compared with 6.5%–8% among those who had not exercised regularly before the campaign ($P < 0.05$).

The mean number of different exercise activities/participant before the campaign was 2.5 for the injured and 2.0 for the rest ($P < 0.01$). The increase in the mean number of activities/participant was not significantly greater for the injured: 0.6 compared with 0.5 activities for the non-injured.

Table 3 illustrates the relationship between recently initiated exercise activities and exercise injuries. It shows that there was no difference between the injured persons

Table 1 Distribution of exercise injuries according to parts of the body affected

Part of the body	Number of answers
Lower leg	46 (64%)
Back	10 (14%)
Arm	6 (8%)
Shoulder	2 (3%)
Eye	2 (3%)
Other parts	1 (1%)
Missing Values	5 (7%)

Table 2 Exercise habits before starting the campaign for those injured and not injured ($P < 0.05$)

	Never exercised	Exercised now and then	Exercised 1–2 times a week	Exercised 3–5 times a week	Elite training	Missing values	
Injured	4 (8%)	24 (6.5%)	21 (6.5%)	14 (15%)	0 (0%)	0 (0%)	63 (6.7%)
Not injured	46 (92%)	345 (93.5%)	299 (93.5%)	81 (85%)	0 (0%)	101 (11.5%)	872 (93.3%)
	50 (5.3%)	369 (39.5%)	320 (34.2%)	95 (10.2%)	0 (0%)	101 (10.8%)	935 (100%)

Table 3 Participants in the campaign exercise who were injured distributed according to changed exercise habits.

	Mean number of different exercise activities before/ during the campaign	Injured persons forced to interrupt their exercising	Injured persons who called a doctor	Injured persons who reported sick
Increased exercise (n= 375)	1.8/3.2	31 (8.3%)	15 (4.0%)	10 (2.7%)
Unchanged exercise (n= 498)	3.2/3.2	28 (5.6%)	20 (4.0%)	9 (1.8%)
Decreased exercise (n= 62)	3.3/2.3	4 (6.5%)	2 (3.2%)	0 (0%)
N = 935		63	37	19

who had participated in more compared with those who had participated in fewer different exercise activities during the campaign.

Discussion

The campaign did not succeed in activating nonexercisers. Only 5% of those who answered the questionnaire reported that they had not exercised before the campaign.

The dropout of the response rate when it comes to the questionnaire is of less importance in this study since the purpose was to reach those who diligently participated in the 1-year campaign. An analysis of the dropouts showed that the registrants who had not answered the questionnaire had not started to exercise to the same extent as the others (11). The highest response was in groups C (84%) and D (70%), i.e., those who sent in most of their monthly reports and thus showed improvements in their health habits.

A comparison with other studies showed that the campaign "Piggare med Corren" had a definitely lower rate of injuries: 6.7% compared with 37%–90%. Some explanations could be:

1. The rate of injury in our study was based only on the reports from the participants contained in the ensuing questionnaire. No medical follow-up was made compared with other studies (8, 10, 16).
2. Our questions only referred to injuries that required cessation of training. Consequently, slight injuries could well have been sustained (7).
3. Those who were injured at the beginning of the campaign and then were frightened to go on exercising (7, 12) were not included since we only studied those who diligently took part in the campaign.
4. Our study comprised assiduous participants in an extensive exercise campaign who exercised with varying degrees of intensity and varying numbers of exercise forms. Most other studies comprise less more homogeneous groups with a high exercise intensity (10, 12).

Our study does not give the total injury risk at the start of an exercise campaign because we chose to register only the injuries that were so serious that they led to a halt in training. There are reasons to believe that the total injury risk was higher than those reported. Consequently, it is important to realize the seriousness of our results. More than one-half of the injured persons went to see a doctor, which was also observed in other studies (12). Almost every third injured person reported sick for an average of 1 month.

It is also important to note that it is not the persons with low levels of activity who, when they start exercising, run the greatest risk of sustaining injury. The rate of injuries seems to depend on the number of different activities, whether recently started or not. There was no significant difference in injuries between the group which had increased its mean activity per week from 1.8 to 3.2 activities and the group that remained unchanged with 3.2 activities (Table 3). Furthermore, the number of opportunities for activities seemed to be of great importance. The rate of injuries was about double in the group who had exercised 3–5 times a week before the campaign compared with beginners and less active exercisers (Table 2). Consequently, a high level of training that had been going on before the exercise campaign seemed to increase the risk for injuries (1, 10, 14, 15). Therefore, it appears to be an important research project, before launching extensive mass media exercise campaigns, to clarify whether, from a health point of view, there is an optimal amount of exercise and, if possible, to define it in numbers of occasions and activities. This is important since exercise campaigns principally reach those who are already physically active.

Naturally, it must not be forgotten in this discussion that regular exercise has many positive effects (6, 19), which we also studied in this campaign. One-fourth of the participants who had suffered from headache, back pain, stomach problems, or sleeping disturbances before the campaign experienced that their symptoms had decreased during the campaign, primarily due to changes in exercise habits (2). Much speaks in favor of the positive effects, which are

greater than the negative aspects in the form of injuries. Of course, this does not reduce the importance of taking measures to minimize the risks of injuries. The lower extremities are most prone to injuries (7, 10, 12, 20). The strains on legs when exercising can be reduced by good sports shoes of the right construction. A suitable warm-up and movement program, which increases the flexibility of the joints and strengthens the muscles, prevents injuries (5, 13) and should be emphasized in the mass media campaigns.

It is also important not to neglect "minor injuries" and pain signals. Much can be done to minimize the risks of injury when exercising (1, 5, 15). The information about health provided to increase the number of regular exercisers in Sweden should be supplemented by means for prevention of injuries.

Conclusions

1. Sixty-three persons (6.7%) reported that they were injured in connection with their exercising during the campaign in such a way that they had to interrupt their exercise. Thirty-seven persons consulted a doctor and 19 persons were reported sick for an average of 1 month because of exercise injuries.
2. Injuries to the lower legs accounted for 64% of all injuries.
3. There were significantly more regular exercisers who had been highly active before the campaign among those who had been injured compared with those who were not injured.
4. Measures to prevent accidents should be emphasized when launching extensive mass media exercise campaigns.

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V

Attitude and behaviour changes in connection with a newspaper health information campaign

Sture Malmgren and Gunnar Andersson

ABSTRACT

A provincial daily newspaper, Östgötacorrespondenten ("Corren"), ran in the period 1977–78 a campaign in Linköping for improved health. It was called "Get fit with Corren" (Piggare med Corren), it comprised exercise, dietary, and antismoking components, and was given much space.

The purpose of the present article is to evaluate the effects of health information via mass media with regard to exercise, diet, and smoking, and to illustrate the intrapersonal processes intervening between presentation of information and behaviour change.

The campaign was studied from two perspectives. One was a total study of participants persevering until the end of the campaign; 935 (60%) of 1568 persons who after the campaign received a questionnaire returned it. The other illustrates through a random sample the effects on the entire population of central Linköping. Of the 248 questionnaires distributed 204 (82%) were answered.

Almost half of the people included in the random sample now consider it more important to keep healthier dietary and exercise habits and more dangerous to smoke. However, as cause of the attitude changes the campaign seems to have drowned in other mass media information. Many of those who changed attitude towards exercise and diet also changed their habits, but many of those who did not change attitude nevertheless changed their behaviour.

It is important to complement the health information as presented in mass media with face-to-face communication to help the individual to sum up his existing collection of beliefs and to arrange them in order of priority, and also to discuss possible alternative habits to give strengthening feedback to new beliefs.

BACKGROUND

During recent decades more and more attention has come to be paid to the significance of human behaviour and the valuations and sets of rules controlling it (1). One part of this problem complex is the importance of life style for health and well-being (2). The research needed to throw light on these questions requires a crossscientific approach. New concepts have arisen, such as behavioural medicine, the field concerned with the development of behavioural science, knowledge and techniques to the understanding of physical health and illness and the application of this knowledge and these techniques to diagnosis, prevention, treatment and rehabilitation (3). An important and interesting question is the effects of health information campaigns? (4). Do they reach the intended target groups, do they succeed in influencing behaviour, and what effects will any behaviour changes exert on health?

In 1977 a comprehensive and well-planned 1-year dietary, exercise, and anti-smoking campaign was launched by Östgötacorrespondenten ("Corren"), a Swedish provincial newspaper, in collaboration with medical experts (5). The most important target group was the population of central Linköping, consisting of 65 000 inhabitants. The campaign was given much space in the paper, special supplements being printed each week over a period of one year. Experts answered readers' queries in a regular column. Collaboration with sports and leisure organisations was established to form exercise groups, and further group formation was stimulated through competition between different places of work.

This study forms part of a comprehensive evaluation of a 1-year newspaper health information campaign. Studies concerning participation, nonresponse, and favoural and unfavourable effects on the participants are published elsewhere (5,6,7).

The purpose of the present paper is to evaluate effects of health information via mass media concerning diet, exercise, and smoking, and to investigate the intrapersonal processes intervening between the presentation of the information and the change in behaviour (8).

METHOD

The campaign was studied in two separate investigations. One is a total study of participants that persevered to the end of the campaign, i.e. a highly motivated group. The other illustrates through a random sample the effects on the entire population of central Linköping (Fig. 1).

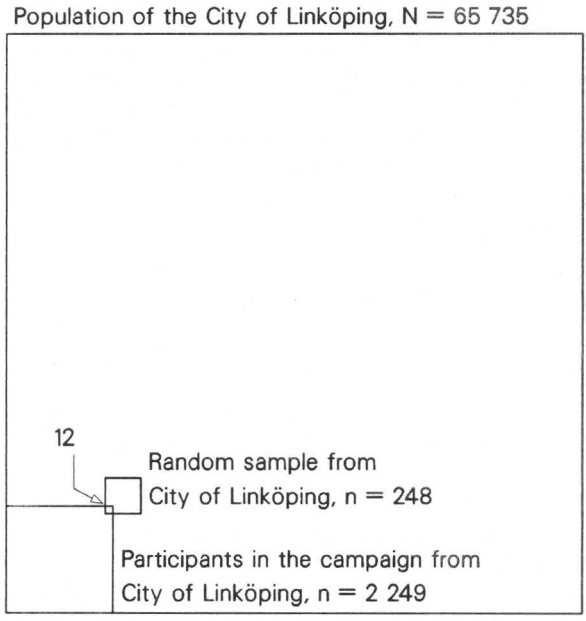


Figure 1. *The population, persons registered in the campaign and the random sample from the City of Linköping.*

Participants

The campaign started in April 1977 and ended in March 1978. 2 887 people volunteered to take part. Information about them was accumulated from registration forms, monthly reports, fitness tests, and questionnaires. Details about selection procedures and participation in the different activities and a detailed nonresponse analysis are published elsewhere (5). 2 249 (78%) were resident in Linköping . During the campaign all participants returned monthly reports to the newspaper about changes in their weight and exercise and smoking habits. The questionnaire was distributed in April 1978 to:

A. All participating in the fitness test (n=844).

B. All registered for the stop smoking part (n=418).

C. All who returned at least 10 monthly reports to the paper (n=433).

D. All who returned one or more of the 3 last monthly reports monthly reports and who cannot be placed in categories A, B, or C (n=220).

935 (60%) of 1 568 persons who received the questionnaire answered and returned it.

Random sample

Sampling was done by the county administration computer section. The population is defined as inhabitants of the City of Linköping over the age of 17, and comprises 65 735 persons. A random sample of 248 was used for the present study. A questionnaire was sent to all these people 1 year after the campaign ended. 204 (82%) returned it or answered it on the telephone; these were representative of the age distribution of the population, but there was a slight underrepresentation of men.

STATISTICS

All the information obtained was computor processed. Significance was determined by the Chi-square test.

RESULTS. RANDOM SAMPLE

Who were reached by the campaign?

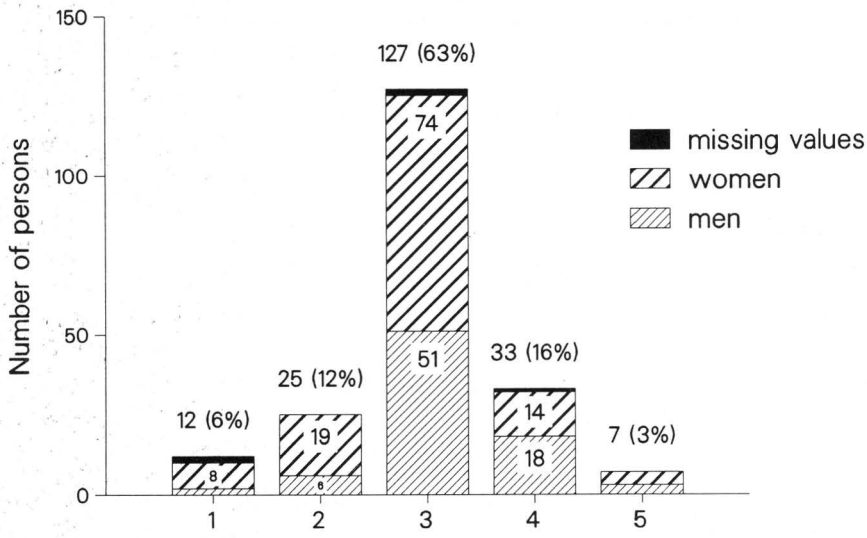
The campaign reached the target group,the population of central Linköping, to the extent that only 3% had not heard about it, and four-fifths followed the progress of the campaign, one fifth of these regularly (Fig. 2).

Dietary, exercise, and smoking habits after the campaign

From the dietary, exercise, and smoking habits reported after the campaign it emerges that one-third practically never regard food from a nutritional point of view, and only occasionally comply with advice about diet. Almost two-thirds rarely or never take exercise, and one-third are smokers.

Changes of attitude

Almost half of the questioned, stated that their attitude to diet, exercise, and smoking had changed since the start of the campaign, and that they now considered it more important to keep healthier dietary and exercise habits and more dangerous to smoke. In other words, one year after the end of the campaign, awareness of the importance of healthier living has been aroused in a large number of people. Most of them agree that it was information via press, radio, and TV that brought about their change in attitude (Table I). However, the campaign under investigation seems to have had very little effect.



1. Participated in the campaign and followed it regularly.
2. Never participated in the campaign but followed it regularly.
3. Knew about the campaign and read about it now and then.
4. Knew about the campaign but never read anything about it.
5. Never heard of the campaign.

Figure 2. *Awareness and participation in the campaign in the sample.*

Table I. *Random sample (N=204). Causes of positively changed i attitude concerning importance for health of diet, exercise, and smoking (several response alternative are possible).*

	Diet n=	Exercise n=	Smoking n=
Information via press, radio, TV	63	46	70
Personal experience	45	44	19
"Piggare med Corren"	12	16	17
Influence of friends	14	15	13
Information via brochures etc.	18	10	13
Other	4	2	1
Total	98	87	88

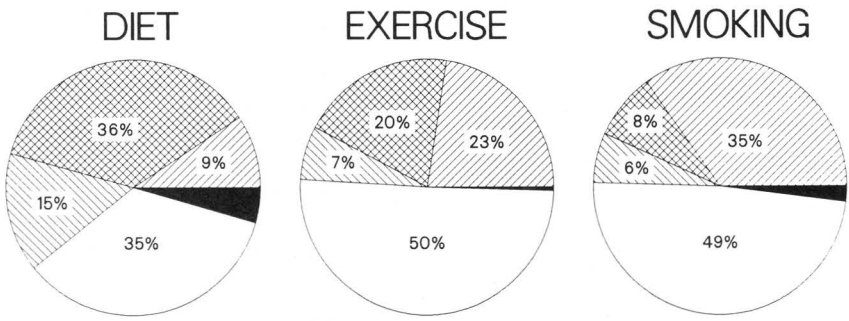
Changed attitudes and changed habits

An interesting question is the extent to which a change of attitude is associated with a change in behaviour, and whether the various reasons for changing attitude differ in some respect. A comparison was therefore made between the number of people who improved or did not improve their habits and the reasons given for the change in attitude. It emerged that for every reported reason for change in attitude, roughly equally many people did in fact change attitude, no matter whether or not the change resulted in improvement in the habit in question. Smoking, however, was a marked exception: 59% of those who cut down smoking gave "personal experience" as reason for the change in attitude, compared with only 11% of those who failed to improve their smoking habits (Table II).

Table II. *Random sample (N=204). Changed health habits related to positive attitude change towards the importance of health habits. Some gave more than one response alternative.*

	Reason for attitude change, source of information					
	"Piggare med Corren", %	Press, radio, TV, %	Brochures etc., %	Friends, %	Personal experience, %	n=
Eating habits						
Improved	12	64	18	12	49	74
Not improved	16	63	16	21	37	19
Exercise						
Increased	20	50	18	18	53	40
Not increased	17	57	7	17	48	46
Smoking						
Improved	24	76	12	18	59	17
Not improved	18	80	16	14	11	31

Comparison between change in attitude and change in habit showed that a large proportion of people who changed their attitude towards diet also changed their eating habits (80%), and that many who did not change attitude nevertheless changed their behaviour (30%) (Fig. 3). 47% of those who changed attitude towards exercise also increased their exercising, but very few (12%) of those with an unchanged attitude changed their exercise habits. Concerning smoking, habit change was not much greater among those who changed attitude (19%) than among those who did not do so (12%).



	Diet n =	Exercise n =	Smoking n =
Positive attitude change without improved habit	19	46	71
Both positive attitude and improved habit	74	40	17
Improved habit without attitude change	31	14	13
No change	71	103	99
Missing values	9	1	4
Positive attitude change	98	87	88
Improved habit	105	54	30

Figure 3. *Distribution of positive attitude and habit change in random sample (N=204) with regard to diet, exercise and smoking.*

RESULTS. PARTICIPANTS IN THE CAMPAIGN

Motives for registration — smoking habits

The most important motives given for enrolment in the stop smoking part of the campaign were "for the sake of health" (72%) and "to improve fitness" (38%). Of those who registered, 11% succeeded in giving up smoking without starting again during the campaign. Those who smoked at the start declared certain positive beliefs about the benefits of smoking (Table III). A number of negative beliefs were also given as grounds for giving up smoking (Table IV).

In a comparison between reasons for failure and reported grounds for smoking, "the desire is too strong" was most common in relation to the motive "to give myself a reward". The most common reason for failure was "too nervous", in relation to smoking "in order to calm down" (Table V).

Table III. *Positive beliefs for smoking given by participants who stopped smoking during the campaign.*

Positive beliefs	Number who responded affirmatively, n=	Stopped smoking, %
Gives concentration	35	11
Gives calmness	64	9
Gives relaxation	99	11
Is "company"	92	9
Is areward for effort	39	10
Keeps the hands busy	52	10
Is stimulating	61	12

Table IV. *Negative beliefs about smoking given by participants who stopped smoking during the campaign.*

Negative beliefs	Number who responded affirmatively, n=	Stopped smoking, %
Causes symptoms	64	8
Expensive	87	12
Creates addiction	93	7
Leads to disease	102	11
Not a good example	38	11

Table V. *Reasons for failure to stop smoking and excuse for continuing.*

	Reasons for failure				
Excuse for continuing	Number who responded affirmatively, n=	Smoking desire too strong, %	Too nervous, %	Work too stressing, %	Weight gain, %
To get stimulation	60	23	15	8	7
To increase concentration	35	17	17	20	9
To calm down	64	19	27	17	11
To relax	99	21	13	8	4
"Smoking is company"	92	15	10	10	8
To give myself a reward	39	31	18	10	5
To keep the hands busy	52	15	15	10	6
Unconscious habit	79	23	9	5	14

RESULTS. COMPARISON BETWEEN PARTICIPANTS IN THE CAMPAIGN AND RANDOM SAMPLE

Motivation

The total study and the random sample show which grounds are considered the most important with regard to (I) the intention to exercise more, (II) increase in exercise, and (III) factual exercise (Table VI). The grounds "improved health" and "fitness" showed fairly good conformity. Reduction of weight was given as important with regard to both intention and factual increase in exercise, whereas "recreation" was important for maintaining the exercise habit.

Table VI. *The four most important motives for exercising, related to intention to exercise more (I), increased exercise (II), and actual exercising (III).*

Motives for exercising	I %	II %	III %
Better fitness	69	63	63
For health and feeling of well-being	58	69	57
To reduce weight	40	32	3
Recreation	15	—	34
Total	n=770	n=54	n=855

I= Participants who answered the questionnaire, registered in the exercise part of the campaign, and gave reasons why they intended to exercise more.

II= Persons in the random sample who stated that they increased their exercising and gave reasons why they did so.

III= Participants in the campaign who exercised during the campaign and who gave reasons why they did so.

DISCUSSION

The two-study design makes possible, assessment of the effective force of the campaign in the total mass media bid, analysis of the differences in effect on different health habits, and illustration of the intrapersonal process from the presentation of information to any change of behaviour that may occur. The intrapersonal process is demonstrated in a theoretical framework modified after Ajzen/Fishbein (8), on the basis of which the results will be discussed (Fig. 4).

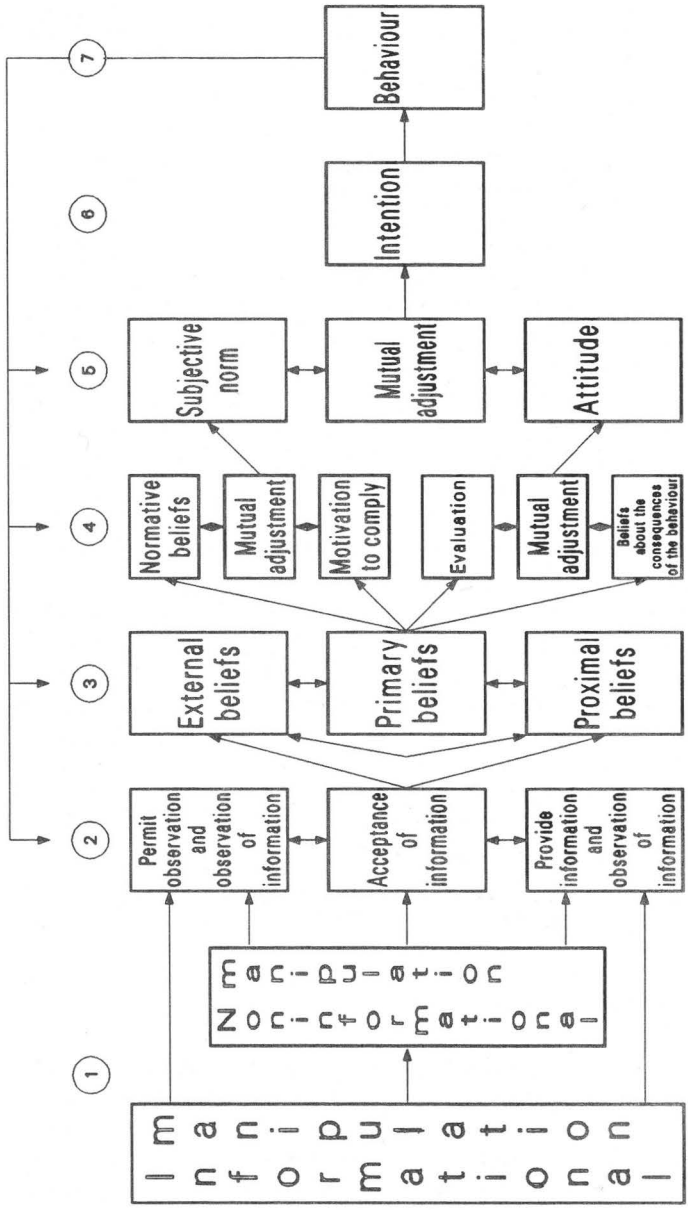


Figure 4. *Processes intervening between presentation of information and behaviour change, modified after Ajzen/Fishbein (8).*

It is essential to distinguish between belief, attitude, subjective norm, intention, and behaviour (Fig. 4). The primary beliefs (step 3) in the form of normative beliefs and beliefs concerning the consequences of behaviour (step 4) serve as the fundamental determinants of the subjective norm and the attitude (step 5). These are the determinants of the intention (step 6), which in turn are the determinants of the behaviour, (step 7). An influence attempt may fail to affect change in behaviour even if the information has been accepted (step 2) but does not produce the desired effects on proximal or external beliefs (step 3), so that primary beliefs are in turn modified so that the process can continue. The subjective norm concerning a behaviour is based on the entire set of primary normative beliefs. A person's attitude towards a behaviour is based, on the one hand, on the entire set of primary beliefs inferring that performing the behaviour will lead to certain consequences, and, on the other hand, his evaluation of these consequences. To bring about a desired attitude change a preceding evaluation process is thus needed. Correspondingly, a change in the subjective norm demands a prior process, in which the motivation to comply is determinant. If the desired intention towards a particular change in behaviour is to be created, a further evaluation process involving adjustment of the subjective norm and the attitude is required. The relative value of each of these determinants varies as a function of the variable for individual difference and the behaviour in question.

"Östgötacorrespondenten" is subscribed to by 83% of Linköping households (5). 19% of the random sample never read about the campaign, whereas 18% not only accepted but actually sought information when they took part in or regulary followed the campaign (Fig. 2). The information ought also to have been accepted but it is difficult to decide how many of the rest accepted the information because surprisingly few said that the campaign had been responsible for their changed attitude towards diet, exercise, and smoking (Table I). The campaign seems to have drowned in other mass media information which combined with pressure from friends and with brochures and other propaganda during the campaign year resulted in about half of the Linköping inhabitants changing their attitude (Fig. 3). After the campaign they now realize more clearly that it is important to eat nutritionally satisfactory food, to exercise in order to feel well, and not to smoke. These declared changes in attitude may have paralleled changes in the subjective norm and possibly also in mutual adjustment of the two.

Our response alternative "personal experience" aims at reflecting the experience of such an mutual adjustment process. The chance of behaviour change ought to be greater when the subjective norm in personal experience is integrated with the attitude. Our results support this assumption, because very few give "personal experience" as the reason for changed attitude towards smoking, in contrast to diet and exercise (Table I), and because fewer reduced or stopped smoking than improved diet and increased exercise even though almost as many claimed to have changed their attitude towards health (Fig. 3). That this personal experience is of particular importance with regard to smoking becomes

evident on comparing change or no change in health habits with declared reasons for changed attitude (Table II). It is only with regard to smoking and "personal experience" that a marked difference emerges between people who changed health habits and people who did not. Of people who cut down smoking 59% gave "personal experience" as the reason for changed attitude; only 11% of those that did not reduce smoking gave this reason.

Concerning attitude and behaviour changes, the differences beween diet and exercise, and especially between diet and exercise on the one hand and smoking on the other, may perhaps be explained by the fact that the relative values of the subjective norm and the attitude vary as a function of the behaviour in question. Health information supplied by mass media can influence the subjective norm, through the experts' advice "Change your habits!", and the attitude, by enlightening the individual about the favourable consequences for health that a change in habits can bring about. If the subjective norm is to be changed the individual must be sufficiently motivated to comply with the advice. It is difficult to alter motivation by means of mass media information, obviously especially with regard to smoking. This also applies to the influence on the attitude, which is based on the entire set of beliefs implying that performing the behaviour will lead to certain consequences. With regard to smoking, our findings among the highly motivated participants in the anti-smoking campaign reflect certain positive and negative beliefs (Table III,IV), the most common negative belief being "smoking will lead to illness".

Here health information has failed to supply sufficient new knowledge, (9,10), and it is clear that most people (about 90%) in their own mutual adjustment of their negative and positive beliefs did not get enough support to succeed in stopping smoking, even though they had professed that they wished to do so (11).

Nevertheless, the health motive seems to be of essential importance as portal of entry to improved health habits (12,13,14,15,16,17). This is evident on comparing (I) "intention to exercise more",(II) "to exercise more" (change of behaviour), and (III) "to exercise" (maintenance of the behaviour); the health motive and "improved fitness" are important in all three (Table VI). Participants also declared that health grounds are highly important for motivation to improve smoking habits: 72% gave improvement in health as motivation for taking part in the anti-smoking part of the campaign.

However, the findings in the present two-study investigation may help to explain why even copious amounts of health information in the mass media will fail to bring about the desired changes in behaviour, even among the most motivated. It appears that in order to succeed the influence on behaviour must initiate an intrapersonal multi-step process which presupposes involvement of several beliefs and valuation and decision processes in which positive and negative beliefs are weighed against each other. In this process it is also important to reach every individual with information adapted to give that particular person an impulse to bring about change (14,18,19). For example a person can hold negative beliefs coupled to smoking, such as that it is expensive, it leads to

illness, and it creates addiction, while at the same time having positive beliefs such as that it is calming and relaxing, it makes me feel less lonely, and it keeps my hands busy. Under such circumstances strengthening his negatives beliefs is not enough. It is also essential to help him to find alternative behaviours that produce the same favourable outcome (Table V). Our results show that the strongest reason for reverting to smoking among those saying they smoke to be calm is "too nervous" and among those who smoke to increase their concentration it is "work is too stressful".

Consequently, even if a process of change is initiated, much time may elapse before a permanent change in behaviour is established. Consequences of the new behaviour experienced by the individual can become retroactively associated with certain beliefs and can come to act together with them to create a new change of attitude, with the result that the intention becomes changed towards regression to the previous behaviour.

The results indicate that massmedia health information should be complemented with face-to-face communication to help the individual to map out his existing set of beliefs and to arrange them in order of priority. In this face-to-face communication also alternative behaviours that can serve as reinforcing feedback to existing beliefs are discussed.

Owing to the complexity of the process of change it is clear that the period between the initiation of a process of change and the resultant permanent change can be very long. Because such a change is also preceded by some form of "personal experience" signalling a change in mutual adjustment of attitude and subjective norm, it can be difficult to evaluate exactly what initiated the process and what, perhaps over a longer period and in different connections, may have reinforced it (20).

CONCLUSIONS

One year after the end of the campaign almost half of those in the random sample now consider it more important to keep healhier dietary and exercise habits and more dangerous to smoke. However, as cause to the attitude changes, the campaign seems to have drowned in other mass media information.

Many of those who changed attitude towards exercise and diet changed their habits; 12% (exercise) and 30% (dietary habits) however did not change attitudes but nevertheless changed their behaviour.

It is important to complement the health information as presented in mass media with face-to-face communication to help the individual to sum up his existing collection of beliefs and to arrange them in order of priority, and also to discuss possible alternative habits to give strengthening feedback to existing beliefs.

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VI

Health Profile Assessment as a screening instrument

Gunnar Andersson and Sture Malmgren

ABSTRACT

Over a period of 18 years we have developed a special method within the area of revelatory communication the purpose of which is to get the individual himself to take responsibility for his health via positive health habits. This method, which we have designated as "Hälsoprofilbedömning", HPB, (Health Profile Assessment), is also a method for screening those who are considered to constitute individuals at risk and who therefore ought to have a motive for revising their way of living. The HPB is begun with a conversation based on a questionnaire which is then followed up by skeletal measurements, blood pressure determination, a submaximal work test on the bicycle ergometer and, finally, a discussion.

The purpose of the present article is to describe this method and its theoretical background and to exemplify its use as a screening instrument for 124 40-year-old employees at Saab-Scania in Linköping.

The participants' perceived stress, troublesome symptoms, high blood pressure, low cardiorespiratory endurance (CRE), and overweight or underweight go along with poor health habits. The high risk group (15%) have high blood pressure, take cardiac medication, are stressed very often, have a very low CRE or have a total of at least four negative components in the HPB. When forming groups according to treatment programs, particular attention should be paid to future risk of illness and the resources which are available.

BACKGROUND

Over a period of 18 years we have developed a special method within the area of revelatory communication the purpose of which is to get the individual himself to take responsibility for his health via positive health habits. This is important since one's lifestyle not only varies according to the length of one's life, illness and health, but also influences to a large extent one's general sense of well-being, joy of living and productivity. This method, which we have designated as "Hälsoprofilbedömning", HPB, (Health Profile Assessment), is also a method for screening those who are considered to constitute individuals at risk and who therefore ought to have a motive for revising their way of living.

The HPB arises from the philosophy of prospective medicine (1) from which other similar methods have developed such as the Health Hazard Appraisal (2) and the Nottingham Health Profile (3,4). In contrast to the other methods, the HPB places more emphasis on the importance of a two-way communication process. This means that the individual actively takes part in the assessment of negative and positive components in his health profile and their importance in regard to his future state of health, and eventually takes the responsibility and initiative for changes in his health habits.

The purpose of the present article is to describe this method and its theoretical background and to exemplify its use as a screening instrument for a group of 40-year-old employees at Saab-Scania in Linköping.

METHODS

"Hälsoprofilbedömning", HPB — Development and testing

From 1968–1978 the HPB was developed and tested within the evolvement of a comprehensive preventive health care program at Saab-Scania in Linköping. This company currently has approximately 6 000 employees. The HPB has its origins in a submaximal work test on the bicycle ergometer which was used as a complement to other medical tests and measurements in a general health examination. The initial conversation and the final discussion have become more and more important, concurrent with growing medical interest in influences on lifestyle. Parallel to the development of standardized forms, the method has been supplemented with additional measurements.

External training of Health Profile assessors began in 1979. Great importance has been attached to guaranteeing as much as possible, based on special forms, the standardized and uniform application of the HPB. In all, 653 Health Profile assessors have been trained throughout Sweden (Fig. 1). Since 1979 approximately 50 000 Health Profile Assessments have been carried out.

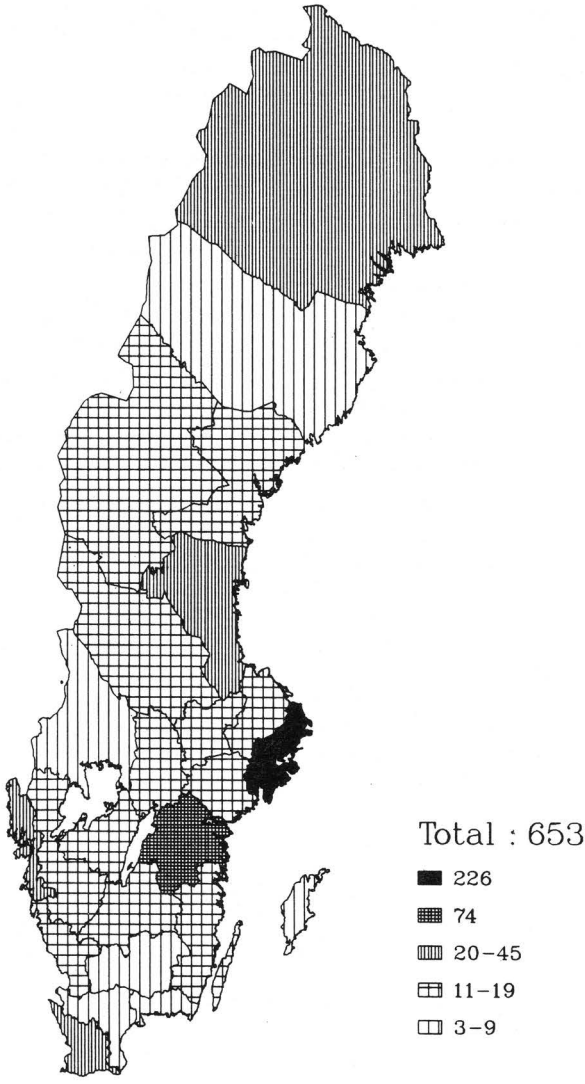


Figure 1. *Participants in the basic course in Health Profile Assessment from 1979–1985. N = 653. 50% of the districts in Sweden are represented.*

Design

The HPB is begun with a conversation based on a questionnaire which is then followed up by skeletal measurements, blood pressure determination, a submaximal work test on the bicycle ergometer and, finally, a discussion.

The HPB — questionnaire

The conversation is begun with questions about physical activity prior to the age of 20 years and the person's current job situation. The questionnaire consists of eleven questions with five fixed alternative answers for each question, one of which is to be chosen (Fig. 2). The answers shed light on some important health habits and what the participant considers his state of health to be. The questions are based on the participant making self assessments which reflect his awareness and conceptions associated with the respective questions. The participant is informed in advance that if there is no answer that is appropriate then the answer farthest to the right and the one farthest to the left are the answers which are most extreme. If the participant does not want to select either of the two most extreme answers perhaps there is a tendency toward one direction or the other. If the individual does not feel that there is a "tendency" toward either direction the alternative in the middle remains.

All questions refer to the past month.

Mode of transportation to work

The questionnaire begins with a question about mode of transportation to work. The answer alternatives indicate whether the person gets to work under his own power or by other means of transportation.

Leisure activities

The second question is subdivided into seven different persuits and is designed to cover leisure activities. The answers are summarized in an index and provide some idea of the person's energy level (4), social contacts and level of activity.

Exercise

The operational concept of exercise is physical activity while wearing a sweat suit or appropriate exercise clothes for the purpose of maintaining or improving one's physical condition or health. Exercise shows a strong positive relationship to better health (5,6,7,8,9), less cardiovascular disease (10,11), less sick leave (12,13), lower mortality rate (14,15,16,17) fewer psychosomatic symptoms (18) and a better sense of general well-being (19,20).

H.O.S.
Sture Malmgren
Gunnar Andersson

QUESTIONNAIRE FOR HÄLSOPROFILBEDÖMNING, HPB (HEALTH PROFILE ASSESSMENT)

Name | Department/Address | Telephone

Answer the following questions, which are the basis of your health profile, by placing an "X" in the appropriate box. All questions refer to the past month.

HÄLSOPROFIL

TRANSPORTATION to work

Car, bus or train	Walk less than 2 km	Walk over 2 km	Bicycle less than 5 km	Bicycle over 5 km
1	2	3	4	5

LEISURE ACTIVITIES

	Never	Seldom	Now and then	Often	Very often
Hobbies	1	2	3	4	5
Activities associated with clubs, organizations (religious, political etc)	1	2	3	4	5
Taking courses	1	2	3	4	5
Spectator sports, going to exhibitions, the Theatre, cinema, restaurants	1	2	3	4	5
Dancing, discoteque, folk dancing	1	2	3	4	5
Painting, carpentry, housework, gardening, shoveling snow	1	2	3	4	5
Walk, cycle, hunting, fishing, go berrying, mushroom picking, outdoor life	1	2	3	4	5

EXERCISE

Exercise refers to activities you take part in, while dressed in a sweat suit or exercise clothes, for the purpose of maintaining or improving your physical condition or health

Never	Occasionally	1-2 times a week	3-5 times a week	At least 5 times a week
1	2	3	4	5

DIET

I never think about my diet	I occasionally follow dietary recommendations	I follow dietary recommendations but not regulary	I follow dietary recommendations regularly	I almost always plan and eat a nutritioned diet
1	2	3	4	5

TOBACCO USE

(If you smoke a pipe or other types of tobacco, try to estimate your consumtion in cigarettes per day)

	More than 30 cig/day	21-30 cig/day	11-20 cig/day	1-10 cig/day	O cig/day
Smoking	1	2	3	4	5

	At least 1 tin/day	4-6 tins/week	2-3 tins/week	Not more than 1 tin/week	I do not chew tobacco
Chewing tobacco	1	2	3	4	5

ALCOHOL INTAKE - beer (not non-alcoholic beer), wine, liquor

I drink very often or periodically in large quantities	I drink often	I drink now and then	I seldom drink	I never drink
1	2	3	4	5

DRUG CONSUMPTION

Do you use Do you use tranquilizers, stimulants or drugs for sleep and/or pain relief?

Very often	Often	Now and then	Seldom	Never
1	2	3	4	5

SYMPTOMS

Do you have back pain, neck pain, stomach problems, headaches, sleeping problems or problems with fatigue?

Very often	Often	Now and then	Seldom	Never
1	2	3	4	5

PERCEIVED STRESS (at work and/or during leisure time)

I feel stressed very often	I feel often stressed	I feel stressed now and then	I feel seldom stressed	I feel never stressed
1	2	3	4	5

PERCEIVED LONELINESS

I am very often lonely	I am often lonely	I am lonely now and then	I am seldom lonely	I am never lonely
1	2	3	4	5

PERCEIVED HEALTH (physical and mental)

Very poor	Poor	Fair	Good	Very good
1	2	3	4	5

Figure 2. *Questionnaire for "Hälsoprofilbedömning", HPB, (Health Profile Assessment).*

Diet

The importance of diet in regard to health has been reported in many studies (21). Eating breakfast regularly and refraining from eating between meals shows a significant positive relationship to better health (6). The participant himself is to judge the status of his dietary habits. The answer primarily elucidates the participant's own assessment of how eager he is to practice proper dietary habits.

Tobacco use

The relationship between smoking and illness is well known and well documented (22). The harmful medical effects of snuff are only incompletely known.

Tobacco use can be quantified and smoking is recorded in consumption per day while taking snuff is recorded per day or per week. Even here the questions is summarized in an index which cover the tobacco use.

Alcohol intake

There is a relationship between extensive use of alcohol and a broad spectrum of somatic illnesses (23). Alcohol is socially destructive when missused and is strongly associated with mental problems and increased mortality (24,25). Modest alcohol consumption, however, has a positive relationship to better health (26,27). Nevertheless interpretation of this finding, however, is ambigous (25,28).

Drug consumption

It is being observed more and more frequently that too large a consumption of sedatives, sleeping medicine and stimulants can lead to addiction and injurious effects.

Symptoms

Many people have psychosomatic symptoms, often a number of them at once (29), such as back pain, neck troubles, stomach problems and headache, without any provable somatic changes. In spite of this, the symptoms must be taken seriously. Many of them require medical treatment notwithstanding the absence of provable somatic changes. Perception of symptoms is a very important variable influencing the use of medical services (30). Sleeping trouble and reported symptoms are also predictors of OTC (Over The Counter) drug use (31).

Perceived stress

Stress in the sense of psychosocial strain influences health and well-being. Examples of causes of stress are a discrepancy between requirements and opportunities in the environment and the individual's ability and needs, — that is,

a poor fit between expectations and perceived reality and role conflicts. Life events are also frequently related to decreased levels of physical health and emotional well-being (32).

The way in which the individual experiences stress is essential. The question is intended to elucidate all the psychosocial stresses which the individual experiences both at work and during leisure time.

Perceived loneliness

In the past few years the importance of the social support network as it affects our mental and physical health has been given more and more attention. Social support has also been linked to resistance to illness (32,33).

A common denominator seems to be perceived loneliness, a variable which, in addiction, appears to be an important factor regarding positive changes in self-rated well-being (34).

Perceived health

The rating of perceived health is significantly associated with physician ratings (35) and is a very important variable influencing the use of medical services (30). Aside from sex and age, perceived health can also be a strong predictor of mortality (35,36,37).

The HPB — physiological and medical measurements

Assessment of overweight and underweight

A vast number of methods are used for determination and calculation of the amount of body fat, and they exhibit methodological errors of various sizes. Methods for determining the amount of fat more precisely, such as hydrostatic weighing, are not applicable outside of the laboratory. In the method we use, measurement of body height and skeletal diameters of the wrists (radio-ulnar) and the knees (condyle of the femur) are included in the determination of lean body mass. With precision and standardization of the anthropometrical measurements the error is $\pm 4\%$ when the method is used on young, healthy persons (38).

Low body mass is related, among other things, to increased mortality (39,40), slight or moderate overweight is related to lower mortality (40,41), and extreme obesity shows a relationship to higher mortality (41).

Blood pressure determination

There is little argument that elevated blood pressure is an important risk factor for "all-cause" as well as cardiovascular mortality (42).

Estimation of maximal aerobic power

An important health related component of physical fitness is cardiorespiratory endurance (CRE). A high level of CRE is related to fewer coronary risk factors (43,44,45).

In the HPB a submaximal work test on the bicycle ergometer is included for estimation of maximal aerobic power (46,47), and physical conditioning index expressed in % of an ideal value (48).

One of the reasons the bicycle ergometer work test is submaximal is to avoid the risks present with exercise stress tests (49).

Perceived exertion

During the final minute on the bicycle ergometer the participant is asked what his perceived exertion is according to the so-called RPE-scale (Ratings of Perceived Exertion) (50). The scale consists of numbers varying from 6 to 20, where each odd number is associated with an expression such as "fairly light", "very hard". Coupled with the absolute load on the bicycle ergometer the participant's assessment of his exertion provides information about his CRE. In a comparison of perceived exertion with an assessment of working pulse on a 7-point scale and the previosly reported exercise habits, an estimate is also made of possible deviations from the average maximal pulse frequency for the age in question.

MATERIAL

Since 1982 the HPB has been carried out on employees at Saab-Scania in Linköping when they become 40 years old. The HPB has replaced the general medical check-up carried out on company employees in this age group. In 1982 there were 50 workers and 112 salaried employees who were 40 years old. 38 persons (23%) declined participation in the HPB. Of the 124 participating 40-year-olds, 10 (8%) were women.

RESULTS

Presentation of the results from the HPB of the 124 participating 40-year-old employees is based on the extent to which negative components were found in the examinations of each person. The components are comprised of the individual's health habits, perceived health and physiological/medical test measurements. Limits of negative components are shown in Table I.

Table I. *Limits and frequency distribution of negative components originating from "Hälsoprofilbedömning", (Health Profile Assessments) carried out on 124 40-year-old employees at Saab-Scania in Linköping.*

	Limits	Number of persons (n)
Exercise	1–2	61 (49%)
Diet	1–2	68 (55%)
Tobacco use	1–4	39 (31%)
Alcolhol intake	1–2	1 (1%)
Drug consumption	1–2	5 (4%)
Symptoms	1–2	26 (21%)
Perceived stress	1–2	25 (20%)
Perceived loneliness*	1–2	—
Perceived health*	1–2	—
Blood pressure	Too high	8 (6%)
Cardiovas. medic.	Yes	1 (1%)
Diabetes	Yes	0 (0%)
Weight	Overweight or underweight	14 (11%)
Cardiorespiratory endurance (CRE)	1–2	17 (14%)

* Questions not included in this study

It is evident from Fig. 3 that the participants' perceived stress, troublesome symptoms, high blood pressure, low CRE, and overweight or underweight go along with poor health habits. Only 8 of the 44 participants with burdensome stress and symptoms have these problems without having them coupled with poor health habits, high blood pressure, low CRE, overweight or underweight.

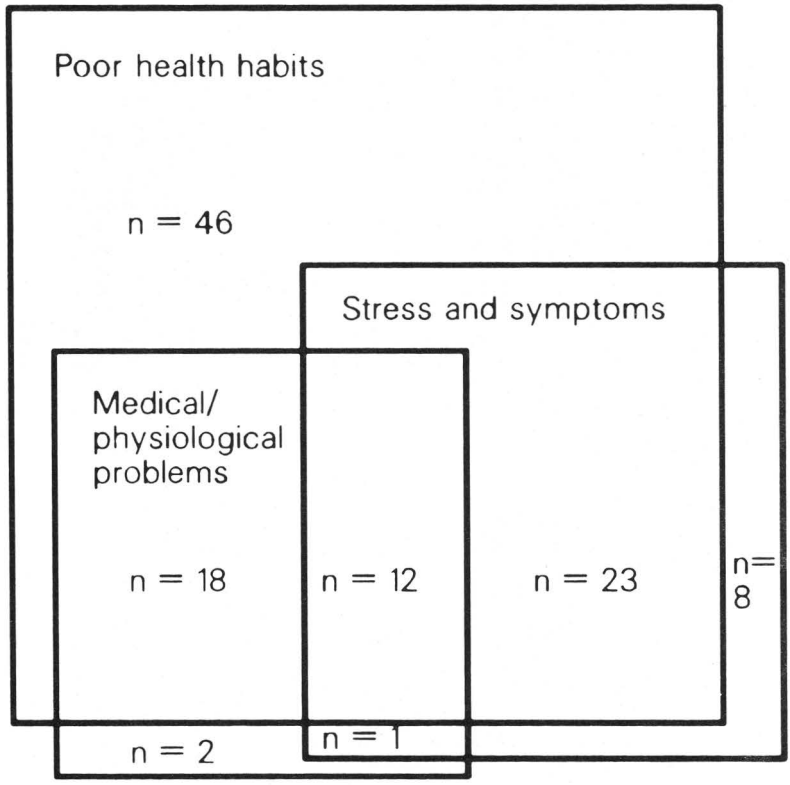
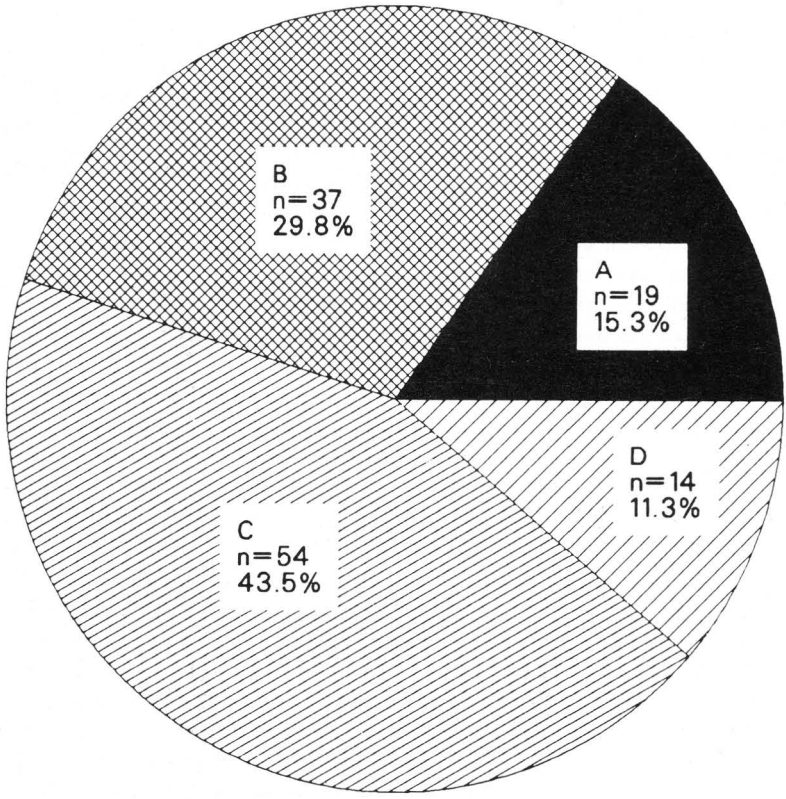


Figure 3. *Patterns of poor health habits (exercise, diet, tobacco use), perceived stress, psychosomatic symptoms and medical/physiological problems in the form of high blood pressure, low cardiorespiratory endurance, overweight or underweight for 124 40-year-old participants in the "Hälsoprofilbedömning", (Health Profile Assessment).*

The majority of the 40-year-old employees (55%) have only 0–2 negative components according to the definitions in Fig. 4 (levels C and D). 15% have high blood pressure (51), take cardiac medication, are stressed very often, have very low cardiorespiratory endurance (CRE) or have a total of at least four negative components (level A).



Negative components in the HPB

A. High blood pressure, cardiac medication, very often stressed, experiences some symptom very often, very low cardiorespiratory endurance or a total of >3 negative components.

B. 3 negative components or totally inactive physically.

C. 1–2 negative components.

D. 0 negative components.

Figure 4. *Presence of negative health components in 124 40-year-old employees participating in "Hälsoprofilbedömning", (Health Profile Assessment).*

DISCUSSION

The HPB is designed primarily with the thought of initiating and motivating a process of change in the individual which will lead in the long run to permanent, sound health habits. The theories and principles which constitute the basis of the development and application of this aspect of the method are described in more detail in a separate article (52). The main idea is that the individual's own assessment of health habits, perceived health, and social ties will obtain feedback when combined both with his own experience of cardiorespiratory endurance and its calculation, plus additional other measurements. This feedback increases the individual's awareness of the degree of truthfulness of the assessment and how important his health habits are for his health. The purpose of most of the questions is to motivate the individual to change his health habits. The intention is not to search for a connection between individual components of his lifestyle and specific illness.

Many different individual-related measurements of health have been developed. One can distinguish between measurements which concern level of function, illness-specific health measurements such as the Health Hazard Appraisal (HHA), the health profiles such as the Nottingham Health Profile, and health indices.

The HPB differs from the HHA, which combines personal health histories and life style factors with computer-based profiles of morbidity and mortality risk, which are often translated into a physical "age" for comparison with true chronological age. An individual can also be given a ten-year estimate of his probability of dying from specific causes and from all causes. From an epidemiological point of view it can be questioned whether the risk factor concept should be given such far-reaching causal significance. Furthermore, we have hesitated to use the risk factor prognostic values in individual prediction. The HHA differs from HPB in some additional respects. Physiological and medical measurements and assessments of perceived health are not included in the HHA.

The Nottingham Health Profile is another method which has some aspects in common with the HPB. It does not have the HPB's association to health habits but is an instrument designed to measure subjective health status in the following areas: physical mobility, pain, sleep, emotional reactions, social isolation and energy.

In summary, The HPB contains certain parts of both the HHA and the Nottingham Health Profile. The HPB has some physiological and medical measurements important for risk level assessment and feedback which are not present in either of the other methods. In addition, the HPB differs from both the HHA and the Nottingham Health Profile in terms of how it is carried out, in that great importance is placed on creating two-way, face-to-face communication.

Information is required to complement the questionnaire so that the HPB will give as complete a picture as possible of the individual's health habits, perceived health and conceptions associated with them. The initial and final two-way discussions with supplementary information are therefore of decisive

importance for both validity and the effectiveness of the motivation. This is dependent on standardized training of those who apply the method so that they can ask supplementary questions and supply commentary and information along with a correct evaluation of the physiological and medical test results in relation to answers in the questionnaire.

A standardized questionnaire, in combination with standardized instructions for answering, constitute the basic prerequisites for good reliability in the psychological part of the HPB. The method also requires at least a week's training in the theoretical background of the method and the practical application of the standardized methods. This is also important for the physiological and medical tests, which require certain basic knowledge. Thus high reliability presupposes good standardized training combined with standardized forms.

The construction of the questionnaire is based on the first two answer alternatives constituting negative components. Smoking is an exeption since there is medical agreement concerning the deleterious effects of tobacco. Reluctance to report troublesome alcohol habits and the fact that alcohol abusers may be more frequent among the dropouts can constitute explanations for the low number of individuals reporting alcohol problems (Table I).

The HPB presupposes that most of the population knows that sound health habits are important for good health and well-being (53,54). Previous research (55) also shows that it is those who already consciously live a more wholesome type of life who, when they come in contact with a broad health promotion effort, are influenced and try to improve their health habits even more. A more deliberate, effective way of influencing the health habits of those who need it most by means of health information therefore requires methods of screening those in whom it is important to take additional interest. In our development of the HPB, resources and routines within preventive health care have been developed simultaneosly. In cooperation with physicians, these can be used to study risk individuals, rehabilitate and recondition them and educate them individually and in groups to more wholesome health habits.

When forming groups according to treatment measures, particular attention should be paid to future risk of illness and available resources. The smaller one makes the high risk group, the greater the relative risk of illness in the defined group at the same time as it comprises a smaller and smaller part of the total expected incidence in the group. One must therefore include the group at medium risk, which results in a greater quantitative effect. We have therefore chosen to distinguish 4 groups with different risk levels. In the high risk group A (15%) there are those who are already ill or experience symptoms, those with high-grade stress or who are in very poor condition, and those who can be considered to have a generally increased risk of poorer health and well-being because of at least four negative components on the health profile (7). Furthermore, two medium-risk groups have been discerned comprising B (30%), C (44%) and one group without negative components. Group B contains individuals with a total of three negative components on the HPB or who are totally inactive physically. The risk level decreases additionally in group C with 1–2 negative components

on the HPB.

The resources needed for these groups are different. Those who belong to the high risk group (A) most often pass through medical examinations, a survey of their place of work, and different health education programs at the Physical Fitness Centre during working hours. In addition to feedback in a comprehensive discussion in the HPB, risk groups B and C also get a form which they take home for comparison between their desired and their current health profiles. From this comparison a contract can be signed for behaviour change and an appointment can be made for follow-up in terms of another HPB. Brochures with information about the significance of different health habits, high blood pressure, stress, and other factors are given out to those who are motivated. And for group D the final discussion in the HPB is often of great importance. In this group there are also those who want to exercise too much and too intensively, which increases their risk of injuring themselves and can decrease the preventive effects of exercise in regard to cardiovascular disease (56).

A study of absence from work due to illness shows that those who do not show up for a HPB despite repeated reminders are those with the highest frequency of absence from work due to illness. We pointed out this problem of reaching those who are perhaps in the greatest need of rehabilitation and retraining to sounder health habits in a study of 50-59-year-old employees at our company in 1975 (12). Those with a high frequency of absence and with varying mental and physical symptoms of illness often go to the company physician for individual advice and are then referred for preventive health care programs. In this way we can help a number of those who are most difficult to motivate to find their own way to sounder health habits.

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VII

Health Profile Assessment as an instrument for revelatory communication

Sture Malmgren and Gunnar Andersson

ABSTRACT

Health promotion in Sweden has for many years been quite extensive in the mass media as well as elsewhere. Practical experience and research indicate that it is difficult to influence people's health habits. Methods of communication are therefore needed which are more adapted to the individual and which stimulate face-to-face communication.

During a period of 18 years we have developed a special method within the area of revelatory communication which we have designated as "Hälsoprofil-bedömning", HPB, (Health Profile Assessment).

The purpose of this article is to describe the use of this method and to examine some mechanisms of importance to the HPB in an empirical study of 610 employees randomly selected from a total of 6 241 employees at Saab-Scania in Linköping, and to elucidate the importance of health promotion, with the HPB as an important component, at a Physical Fitness Centre.

The HPB is begun with a conversation based on a questionnaire including self assessment of health habits and some health experiences, and is followed by measurements of blood pressure, anthropometric measurements, and a submaximal work test on the bicycle ergometer, and it is completed with a discussion.

The most dominant answer in the random sample study to the question about what or who had influenced those who had recently begun exercising regularly was "own conviction". Most of those who exercise regularly are among those who previously or currently utilize the Physical Fitness Centre. Nearly all those asked seem to be aware that exercise is important. The reasons people do not exercise do not seem to be rational but instead are either not conscious or are connected to previously formed beliefs about the consequences.

2 *Health Profile Assessment as an instrument for revelatory communication*

BACKGROUND

Health promotion in Sweden has for many years been quite extensive in the mass media as well as elsewhere. The lack of selectivity and adaptability to the individual, however, often causes the short-term effects to be meagre in relationship to the effort expended (1). Methods of communication are therefore needed which are adapted to the individual and which stimulate face-to-face communication (2,3,4).

Research concerning behaviour modification has also increased greatly in recent years and has generated a number of theories, methods and techniques (5). It is essential that their application should not be limited to individual treatment of a clinical psychology character but that their practical application should also be tested using scientific assessment so that they can attain widespread use within the area of health promotion (6).

There is much that indicates that the ideal communication situation is face-to-face conversation in which two persons sit and talk with one another (7) and in which the roles of initiative and interest are as similar as possible. In this way interest is generated in the reciprocal sharing and contributing of information with another individual and there is continuous adaptation to the recipient (4). It is essential that a method that creates this face-to-face situation can be standardized and duplicated.

During a period of 18 years we have developed a special method within the area of persuasive communication. We call it revelatory communication because the importance of creating self-motivation, internally generated motivation (8,9), a kind of revelation. The method is designated as "Hälsoprofil-bedömning", HPB, (Health Profile Assessment). It is also a method for screening, which is described in a separate article (10).

The purpose of this article is to describe the use of this method based on the theoretical framework of Fishbein/Ajzen (11) and also to examine some mechanisms of importance to the HPB in an empirical study and to elucidate the importance of health promotion, with the HPB as an important component, at a Physical Fitness Centre.

HÄLSOPROFILBEDÖMNING

The HPB comprises three components: self assessment of important health habits, self assessment of some health experiences, and some medical and physiological measurements. The HPB is begun with a conversation based on a questionnaire which is followed by measurements of blood pressure, anthropometric measurements, and a submaximal work test on the bicycle ergometer, and it is completed with a discussion. The dialogue is begun with questions about physical activity prior to the age of 20 years and the person's current job situation.

The questionnaire consists of a number of questions the answers to which

shed light on some important health habits and what the participant consider his state of health to be. Only one of the five given response alternatives can be chosen. The questions are based on having the participant make a self assessment which reflects his own awareness and conceptions associated with the respective questions.

All questions refer to the past month. The first five questions in the questionnaire concern: *mode of transportation to work, leisure activities, exercise* (in sweat suit or exercise clothes, for the purpose of maintaining or improving the physical condition or health), *diet*, and *tobacco use*. The person conducting the dialogue and test transfers the answers from the questionnaire to a new form (Fig. 1) and by means of supplementary questions tries to help the person undergoing the HPB to determine whether he has correctly understood the questions and answered them accurately. He then has a chance to revise his assessment. The next two questions concern *alcohol intake* and *drug consumption* (the taking of tranquilizers, stimulants or drugs for sleep and/or pain relief). The final questions concern the individual's experience of *psychosomatic symptoms, stress, loneliness* and *health*. The questionnaire is described in more detail in another article (10).

The measurements are begun with diastolic and systolic blood pressure. Overweight and underweight are assessed by anthropometric measurements (12). These measurements are followed by a submaximal work test on the bicycle ergometer (13,14) in which the individual also makes an assessment as to how strenous he thinks the test is based on the so-called RPE-scale (15).

"HÄLSOPROFILBEDÖMNING" AS REVELATORY COMMUNICATION

Theoretical background

Practical experience and research indicate that it is difficult to influence people's health habits (16). Special methodology is also required in a face-to-face situation in order that it provide necessary impulses for a decision to change in the individual. Several theories and explanatory models exist which discuss and outline the prerequisites for obtaining desired effectiveness (11,17). The processes which one aims at comprise both interpersonal communication and the initiated intrapersonal processes which are to result in behaviour change. This is a very complicated process which means that theories, models and their theoretical application only give a simplified picture.

The HPB has been developed from a modified theoretical framework of Fishbein/Ajzen (11) which is described in more detail in a separate article (18). According to this method man can be viewed as a fairly rational processor of information available to him (19). A special behaviour is initiated by an specific intention which in turn is determinated by an adjustment of the subjective norm and the attitude which are determined by a set of beliefs. Information which is

HÄLSOPROFIL

TRANSPORTATION TO WORK 1 2 3 4 5	First name		Last name		
	Street		Community and postal number		
LEISURE ACTIVITIES 1 2 3 4 5	Telephone Work: Home:	Employee Number	Department	Civic registration number	
EXERCISE 1 2 3 4 5	**EXERCISE BEFORE 20 YEARS OF AGE** 1 2 3 4 5		**WORKING SITUATION** 1 2 3 4 5	Sex ☐ Male ☐ Female	Age
DIET 1 2 3 4 5	Date		Blood pressure / Pulse	Work load (Watt)	
TOBACCO USE 1 2 3 4 5	Height		Cardiovascular medication ☐ yes ☐ no Diabetes ☐ yes ☐ no	Perceived exertion 7 6 5 4 3 2 1	Working pulse 7 6 5 4 3 2 1
ALCOHOL INTAKE 1 2 3 4 5	Radioulnar + Femoral condylar +		Pulse / Watt 1 2 3 4 5 6 7 8 9 10 11 12		
DRUG CONSUMPTION 1 2 3 4 5	Skeleton weight	Lean body mass		VO_2 max (l/min) ( ) 1 2 3 4 5	
SYMPTOMS 1 2 3 4 5	Lower weight limit	Upper weight limit		VO_2 max (ml/kg × min) 1 2 3 4 5	
PERCEIVED STRESS 1 2 3 4 5	Average weight	Actual weight		Conditioning index ( ) 1 2 3 4 5	
PERCEIVED LONELINESS 1 2 3 4 5	Family data Cohabiting ☐ Single ☐		Estimate of determined values: Underestimated / Correct / Overestimated Average weight ☐ ☐ ☐ VO_2 max (ml/kg × min) ☐ ☐ ☐ Conditioning index ☐ ☐ ☐		
PERCEIVED HEALTH 1 2 3 4 5	Notes				Signature

Figure 1. *Form for Hälsoprofilbedömning.*

CARE FOR YOUR HEALTH PROFILE AND BE AWARE OF THE IMPORTANCE OF

Notes

to result in a permanent change in behaviour in a person must therefore bring about the changes in beliefs which, in an intrapersonal multi-step process, result in the intended changes in behaviour. This means that the individual can make a decision about a specific behaviour change on the basis of available new information which has been processed into an intention. It is therefore important to bring about communication which stimulates a rational testing of the beliefs which lie behind negative or positive health habits. Great importance is placed on how the HPB as a whole is carried out so that confident and open communication is brought about.

Application

Thus the HPB is based on the assumption that every individual can learn to trust himself, to think for himself, and to make his own decisions regarding a change in behaviour. The purpose of the HPB is to begin a process within the person in which his current life style is rationally evaluated and in which he is made aware of the beliefs which lie behind his different health habits, and in which these beliefs are reconsidered. It is therefore important for the person administering the HPB to create a very positive relationship and good conditions for optimal intellectual exchange.

The interview is begun with a question concerning physical activity during the years the person was growing up and is intended, along with supplementary questions, to bring to the fore and make conscious the beliefs which came into existence during childhood and adolescence. By means of questions the working situation, many health habits, the social situation and beliefs concerning the person's own health, are gradually brought to the fore. When measurements are begun a natural concentration on rational communication occurs. Detailed information is given about the background of the methods and interpretation of the measurements. A person undergoing the HPB thus continuously takes part in a logical discussion concerning the significance and interpretation of the new information. Not only inferential beliefs are influenced in this way through revelatory communication. Descriptive beliefs, which are formed on the basis of direct observation are also influenced through active participation (20). When the submaximal work test is carried out, for example, the person indicates the amount of perceived exertion expended in the final minute. By relating this to the actual load, the individual receives directly experienced information, which is quite likely accepted, concerning his actual work capacity.

In the final discussion the connection takes place between the test values and the experience of the tests on the one hand and the different components of the HPB on the other. Great importance is attached to having the person who is undergoing HPB take part in the logical discussion in which his own assessment of the components of his life style are related to the different test values and to his own experience of his social situation, stress, symptoms and health (8). Supplementary information is given as the basis for an inference process which can generate and/or strengthen beliefs concerning a certain behaviour resulting

in certain consequences. A logical decision based on one's own conviction to change behaviour (intention) can be made in order to attain better health, or avoid illness, in the short or the long run.

The inference process which precedes a decision about behaviour change is so complex, however, that it can take a long time before a specific intention is formulated so concretely that it can be transformed into a specific change in behaviour (18). The length of time is determined by, among other things, how long and with what intensity a process of change, with the change in question as the goal, has already been in progress. The HPB is therefore most often concluded with a written contract for change (Fig. 2) which stimulates the initiated process (8,21) and in which the client makes a continued analysis of his life style in terms of a comparison between current and desired health profiles. Initially the decision can only be made about *one* change. This is described concretely and reasons are given, and time-points for starting and for follow-up are specified, which makes feedback possible with reinforcement of the new behaviour. It is important to find the costs and rewards which are relevant to a particular person and to a particular behaviour change situation (22).

HEALTH PROMOTION AT SAAB-SCANIA, LINKÖPING

Since 1968 the HPB has been developed and tested at Saab-Scania in Linköping, a company with about 6 000 employees. Many versions have been developed from a work test in combination with advice on exercise (23). The HPB with its preliminary stages has constituted an important factor in the development of preventive health care in the company.

The centre for this activity is the Physical Fitness Centre which is located near the company in a green open area with hilly trails. It comprises changing rooms, saunas, and rooms with special equipment for weight training, conditioning, gymnastics, rehabilitation, physiotherapy, treatment and instruction. All new employees are introduced to the Centre and are summoned to a HPB after one year. Follow-up takes place according to screening principles reported in a separate article (10). A large proportion of the approximately 70 000 visits per year made by the employees occur on their own initiative during their leisure time. Employees with cardiovascular disease, problems with the locomotor apparatus, stress and tension symptoms, problems with substance abuse, psychosocial stress, overweight, poor physical condition, and other problems, are referred to the preventive medicine health workers, recreational leader, or physiotherapist, for instruction and training during their working hours. The HPB constitutes an important component in this orientation to more sound health habits.

CONTRACT FOR YOUR FUTURE HEALTH PROFILE

DESIRED HEALTH PROFILE	CHANGES FROM NUMBER	→	TO NUMBER
HÄLSOPROFIL: TRANSPORTATION TO WORK 1 2 3 4 5			
LEISURE ACTIVITIES 1 2 3 4 5			
EXERCISE 1 2 3 4 5			
DIET 1 2 3 4 5			
TOBACCO USE 1 2 3 4 5			
ALCOHOL INTAKE 1 2 3 4 5			
DRUG CONSUMPTION 1 2 3 4 5			
SYMPTOMS 1 2 3 4 5			
PERCEIVED STRESS 1 2 3 4 5			
PERCEIVED LONELINESS 1 2 3 4 5			
PERCEIVED HEALTH 1 2 3 4 5			

Desired health profile
Begin by filling out the "Questionnaire for Health Profile Assessment". Think very carefully about each question. Don't think about whether or not it's possible to carry out today, but think instead about whether you are totally convinced that this is the way you want your Health Profile to look in the future. In this way you draw up the Health Profile you want for yourself and you then transfer it to this contract.

Comparison
Now you can compare this Health Profile with your present one. Indicate which changes you want to make with numbers and arrows in the boxes to the left. Also indicate the number of desired changes you want to make.

☐ 4 or more ☐ 3 ☐ 2 ☐ 1 ☐ no changes

Decision
In order to succeed with your desired Health Profile over the long run, begin with **one** change. Decide carefully what you want to start with and when, where and in what way you want to start. When you have successfully made one change, then is the time to begin with the next one.

I shall change my_____

starting_____ At that time I shall_____
day month year,

I am going to do this because_____

Follow-Up
At the end of each month I shall ask myself the following questions and write down the answers:
– How have I done?
– What has this meant to me?
I want to come for a new Health Profile Assessment within:

☐ 6 months
☐ 12 months
☐ _____
☐ Not at all

I took part in a Health Profile Assessment on _____
Day Month Year

Name _____ Civic registration number _____

Employee noumber _____ Dept. _____ Telephone _____

Date _____ Signature _____

Figure 2. *Contract for your future health profile.*

RANDOM SAMPLE AT SAAB-SCANIA, LINKÖPING 1983

Method

A study was done in 1983 at Saab-Scania in Linköping. It comprises 610 employees randomly selected from a total of 6 241 employees. 59% of the subjects were salaried white-collar employees and 41% were blue-collar workers. 18% were women.

A comprehensive questionnaire was sent to the selected group in the Spring of 1983 and after two reminders the response rate was 85.3%. The questions asked in the questionnaire referred to health habits and leisure time activities, among other things. The questionnaire also included questions about utilization of the company's preventive health care and recreational resources and possible changes in exercise habits and the reasons for these changes.

All the information was computor processed. Significance was determined using the chi-square test.

Results

Those who report that they have begun exercising regularly lately respond to the question about what or who has influenced this decision predominantly by stating that it is their "own conviction" (Table I).

Table I. *Factors influencing more exercise and regular exercise lately (several answers possible).*

If you have begun to exercise regularly lately, what or who influenced your decision?

	n=
Own conviction	170
Another person or persons	32
Other reasons	20
Work test or HPB	12
Ordination from health care personnel	4

Most of those who never exercise are among those who never utilize the Physical Fitness Centre (Table II). Most of the regular exercisers are found among those who now utilize the Physical Fitness Centre or have used it at some time.

Table II. *Utilization of Physical Fitness Centre according to exercise habits (col %). p<0.0001.*

	Utilize Physical Fitness Centre				
Exercise habits	Never	Previously Not now	Now and then	Regularly	Total
Never	4(37%)	22(12%)	1(2%)	0	97(20%)
Now and then	71(35%)	64(37%)	14(25%)	0	149(30%)
Regularly, 1–2 times/week	40(20%)	68(39%)	24(43%)	24(39%)	156(32%)
Regularly, ≥3 times/week	17(8%)	21(12%)	17(30%)	37(61%)	92(19%)
Total	202	175	56	61	494

Missing values=26

Only 18.5% of those asked consider themselves to be sufficientlty active so that they therefore do not exercise more, and nearly everyone considers exercise important since not even 1% think that exercise is not so important (Table III). The predominant explanation as to why they do not exercise more is that there is not enough time.

Table III. *Answers to the question: Why haven't you exercised more in the past year? (more than one answer possible). Answers in % of all who were asked (N=520).*

	%
Not enough time	39.4
Haven't got around to it	26.3
Sufficiently active	18.5
Illness, locomotor problem, injury	8.7
Exercise is boring	6.0
Haven't found the right activity	4.4
Don't know	3.5
Disappointed in previous contact with exercise	1.0
For various reasons I don't dare	0.8
It's not so important	0.6
I don't know how to go about it	0.4

10 *Health Profile Assessment as an instrument for revelatory communication*

A comparison between the leisure time activity profiles of those who never exercise (wearing exercise clothes and for the purpose of improving one's condition or health) and those who exercise regularly at least three times a week shows that those who are very active exercisers are considerably more active in their leisure time than the non-exercisers (Fig. 3).

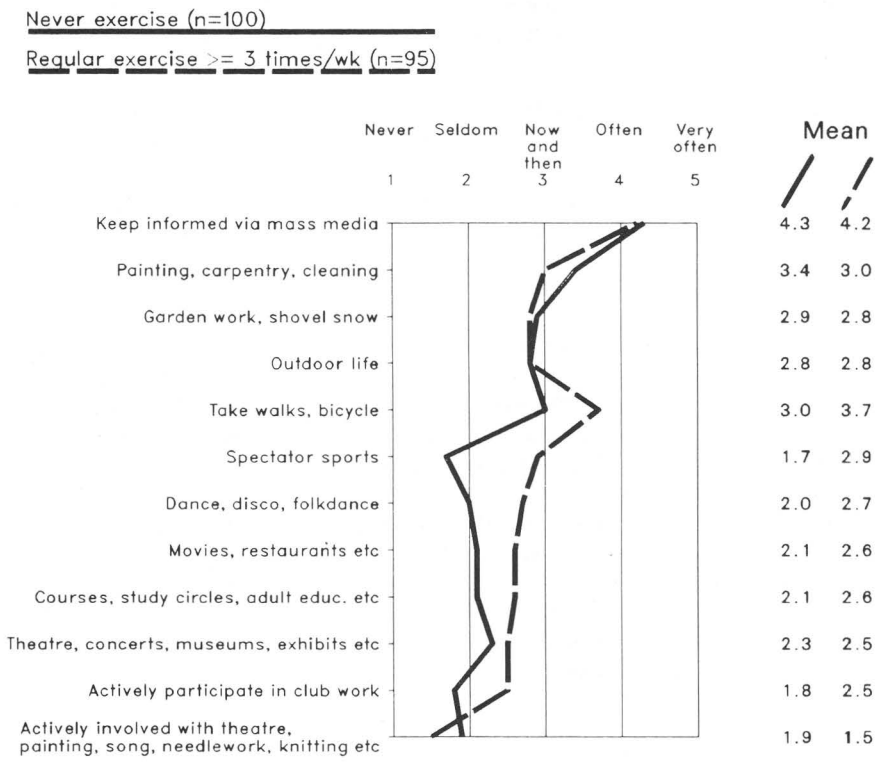

Figure 3. *Leisure time activity profiles for exercisers and non-exercisers.*

Of those who indicate a lack of time as a reason for not getting more exercise there are only 15% who never exercise, or just as many as there are of those who are very active exercisers (Table IV). There is no difference between those who indicate a lack of time for exercise and the others concerning civil status and the amount of time needed for travelling to and from work. Of those who consider themselves to be sufficiently active there are 31% who never exercise or exercise only now and then. The greatest number of those who indicate that they simply do not get around to exercising or that exercise is boring are found among those who never exercise or only now and then.

Table IV. *Reported resons for not getting more exercise the past year distributed according to exercise habits (col %). More than one answer possible.*

Exercise habits	n=	Sufficiently active	Lack of time	Haven't gotten around to it	Illness, locomotor problem, injury	Think exercise is boring
Never	100	13(14%)	31(15%)	39(29%)	16(36%)	16(52%)
Now and then	157	16(17%)	68(33%)	61(45%)	12(27%)	10(32%)
1–2 times/wk	158	26(27%)	74(36%)	28(20%)	10(22%)	4(13%)
≥3 times/wk	92	40(41%)	29(14%)	6(4%)	6(13%)	0(0%)
Missing val.	13	1(1%)	3(2%)	3(2%)	1(2%)	1(3%)
Total	520	96	205	134	45	31

Of those who indicate a lack of time as an explanation as to why they do not exercise more, an aversion to utilizing work time for exercise is greatest among those who never exercise (36%) and the proportion that are clearly positive is smallest (Table V). The most active are most positive toward utilizing work time for exercise and are least negative and doubtful.

Table V. *Distribution of exercise habits for those who gave "lack of time" as a reason for not getting more exercise and who took a stand on training during work hours (row%).*

Lack of time as the reason for not exercising more and wants to exercise during working hours.

Exercise habits	Yes	No	Don't know	n=
Never	15(48%)	11(36%)	5(16%)	31
Now and then	39(57%)	8(12%)	21(31%)	68
1–2 times/week	47(64%)	12(16%)	15(20%)	74
≥3 times/week	22(76%)	3(10%)	4(14%)	29
Missing values	123	34	45	202

DISCUSSION

The most dominant answer to the question about what or who had influenced those who had recently begun exercising regularly was "own conviction" (Table I). A smaller number mentioned other persons or reasons and only few mentioned the work test or the HPB. According to the communication theories

from which the HPB is developed, this is not surprising. The intrapersonal process which may possibly result in behaviour change has many steps (18) and takes place on many levels. Only when the process has reached an mutual adjustment of the subjective norm and the attitude can an intention arise for a permanent behaviour change. The individual makes a decision based on his own conviction. The process from information to "own conviction" can take a long time and the individual forgets the additional information and communication which stimulated and influenced it. The intrapersonal inference process is what becomes apparent and is experienced as one's "own conviction". This makes it difficult to evaluate the significance of individual factors which may have influenced the process.

It is evident from the fact that most of those who exercise regularly are among those who previously or currently utilize the Physical Fitness Centre (Table II) that a Physical Fitness Centre with a stimulating social environment, personnel for advice and counseling, testing, a HPB, different rehabilitation programs, etc., are very important. Half of those who previously utilized the Physical Fitness Centre, however, are only sporadic exercisers or do not exercise at all (Table II).

This is not satisfactory and it demonstrates the problem with adherence (8) and the need for an instrument such as the HPB. The HPB provides an opportunity to initiate an intrapersonal process in which the individual becomes aware of his beliefs and in the long run is able to change them so that an intention for the desired behaviour change arises. It is evident from our results that people are often not aware of all these beliefs or of the opposition which can exist among them. Almost everyone thinks exercise is important (Table III), but nevertheless only about half of this persons exercise regularly (Table IV). Only 18.5% do not exercise more because they think they are already "sufficiently active" (Table III). In addition, 31% of them exercise only sporadically or do not exercise at all (Table IV). The latter individuals obviously think that they are sufficiently active through some other form of activity. A comparison between this category and those who exercise very actively, however, shows that non-exercisers only take walks and bicycle rides sporadically and are otherwise much less active than those who are very active (Fig. 3).

The most frequent answer to the question as to why a person does not exercise more is "lack of time". It seems, however, to be more a matter of a lack of energy (24) and a lack of the desire for activity than a lack of time, since those who exercise very actively are also much more active in other respects in their free time than are those who do not exercise. The belief of non-exercisers concerning "lack of time" can therefore be due to normative beliefs which give a low priority to regular exercise. That this may be the case is confirmed by the results which show that of those who never exercise and report a lack of time, less than half would want to use time at work for exercising and more than one third say "no" in contrast to those who are already active and who are very positive (Table V).

Besides lack of time, the most common explanation for non-exercisers and

sporadic exercisers for not getting more exercise is "haven't got around to it". These persons are simply not aware of which beliefs may cause one "not to get around to it", despite the fact that they are aware that exercise is important. Those who think that exercise is boring are few and are found primarily among those who do not exercise regularly. In these cases there are "beliefs about the consequences" of beginning to exercise which are not based on experience, since only 1% report that previous experience with exercising was disappointing.

The reasons people do not exercise do not seem to be rational but instead are either not conscious or are connected to previously formed ideas about the consequences. Special combinations apply for each individual and they are so complex that a HPB alone cannot cause an immediate behaviour change unless a process of change is already close to a decision — "own conviction" — concerning a concrete change. It is therefore important that the process which has been initiated is then supported with a contract and/or with follow-up involving an orientation program and the social rooting of a new behaviour in a positive environment such as a Physical Fitness Centre which supports in earlier findings (8,25,26).

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