THE NORWEGIAN CHOLESTEROL CAMPAIGN: A ONE YEAR FOLLOW-UP EVALUATION OF A LOCAL ACTION

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The Norwegian cholesterol campaign: one year follow-up evaluation of a local action — K-I. Klepp, S. B. Matthiesen, R. J. Ulvik, L. E. Aaro – Homeostasis 33, 5–6, 1991 – As part of a Norwegian campaign to reduce serum cholesterol levels, the general public of the City of Bergen was invited to participate in cholesterol testing in October 1988. Participants received the results of the cholesterol screening and nutritional information from trained health personnel. In order to evaluate selected aspects of the campaign, a short questionnaire was mailed to all 354 participants 1–2 weeks after the initial cholesterol screening, and then again one year later. Participation-rate exceeded 90% at both surveys. Demographic variables and cholesterol levels were obtained at baseline, whereas participants' perceptions and reactions to the campaign, as well as their intentions to change eating patterns were assessed both in 1988 and in 1989. In addition, whether or not participants had had their cholesterol remeasured during the past 12 months (and if so, the result) as well as implemented dietary changes were assessed in October 1989. Results from this study showed that cholesterol screening was perceived very positively by the participants, that participants with a high baseline cholesterol level reported that they intended to make dietary changes, and that they, one year later, reported to have implemented a number of health enhancing dietary changes. A smaller, but substantial proportion of the population did, however, report becoming alarmed when receiving the test results. Subjects who did not experience a reduction in cholesterol level over the next year remained alarmed. Thus, cholesterol screening has the potential of creating fear concern and should, for this reason, be conducted by trained health personnel only, and accompanied by appropriate counselling.

Key words: Cholesterol screening, perceived benefits, fear arousal, eating behavior

INTRODUCTION

Coronary heart disease is the leading cause of death in Norway (Report No. 41 to the Storting, 1987–88). As part of an ongoing effort to reduce dietary fat intake and thus cholesterol levels in the general population, a national cholesterol screening campaign was launched by the Norwegian National Public Health Association in 1988. Its goal was to educate health personnel regarding cholesterol, diet and heart disease, and to provide the general public with an opportunity to receive cholesterol testing and dietary counselling from trained health personnel (Matthiesen et al., 1990). Even though screening programs elsewhere have demonstrated that cholesterol levels can be significantly lowered (Murray et al., 1986; Flesland et al., 1990; van Beurden et al., 1990), little is known about factors predictive of successful cholesterol reduction, nor of potential negative outcomes of such large-scale screening programs.

In order to investigate how subjects participating in the Norwegian cholesterol screening campaign perceived the screening and the dietary counselling provided, an evaluation of the local campaign in the City of Bergen was conducted. This paper presents results regarding participants' perceptions of the campaign, and the extent to which participants reported dietary changes at a one-year follow-up survey.

METHODS

Subjects participating in the initial cholesterol screening in 1988 were informed about the event through local mass media. Approximately 450 people attended the event and of these, 354 subjects had their cholesterol measured (done on a first come first served basis). The baseline survey was mailed home to all of the 354 subjects who had had their cholesterol measured. Of these, a total of 336 subjects (94.9%) completed and returned questionnaire. The results from this baseline survey has previously been published elsewhere (Matthiesen et al., 1990). A year later, in October 1989, a short questionnaire was mailed home to the 354 subjects who initially had had their cholesterol measured. This time 328 subjects participated (92,7), and of these, 318 had also participated in the baseline survey. Thus, the cohort sample employed in this study consists of 89.9 % (N=318) of the total eligible population.

Both at baseline and at the one year follow-up survey, participants were asked whether or not they perceived the local Bergen campaign as informative and beneficial, whether they were pleased or alarmed by their test results, and whether or not they intended to change their eating patterns. In addition, participants were asked at the one year follow-up whether or not they had had their cholesterol level reexamined during the past 12 months, and if so, what was the cholesterol level last time it weas measured. Participants were also asked what type of dietary changes they had made during the past 12 months. The range, mean values, standard deviation and sample size for these variables are presented in Table 1.

Demographic variables including gender, age, educational level and marital status were collected through the baseline questionnaire. At baseline, serum cholesterol levels were obtained from testing fingerprick capillary blood in one of three dry-chemistry Reflotron instruments from Boehringer Mannheim, FRG. Prior to testing, the internal consistency between these Reflotron instruments had been tested for cholesterol levels in the range from 2.8 to 10.6 mmol/l. The internal consistency was found to be satisfactory.

Data were analyzed using the statistical package for Social Sciences-PC. Chi-square test, t-test, analysis of variance, Pearson's correlation coefficients and multiple regression analyses are presented.

RESULTS

The cohort sample consisted of 52.5 % women. The average age was 51.4 years (ranging from 13 to 78 years of age), 81 % reported to be married, and 31 % reported having college education while 14 % had nine or less years of compulsory school. The average cholesterol level was 6.7 mmol/l (ranging from 2.9 to 11.4), and participating women had on the average higher cholesterol values than did participating men (6.9 vs 6.5 mmol/l; $p < 0.01$).

Table 1: Range, sample size, mean values and standard deviation for participants' perceptions and reactions to the cholesterol screening

	Range	N	Mean	S.D.
Perceived benefit from campaign (1988)*	1–5	303	4.72	0.75
Perceived benefit from campaign (1989)	1–5	304	4.51	0.79
Immediate reaction to baseline test result (1988)	1–5	306	2.04	1.03
Immediate reaction to latest test result (1989)	1–5	315	1.83	0.97
"Current" reaction to baseline test result (1988)	1–5	291	2.04	0.85
"Current" reaction to latest test result (1989)	1–5	281	1.84	0.82
Intention to eat more healthily (1988)	1–4	311	2.52	0.75
Intention to eat more healthily (1989)	1–4	318	2.05	0.67

* Year in parentheses refer to when the questions were asked.

At follow-up, 43 % reported having had their cholesterol level measured at least once since participating in the cholesterol screening campaign, and 9.8 % reported having the cholesterol level measured at least twice within the last year. Subjects who had retested their cholesterol levels within the past year had a significantly higher baseline cholesterol level than those who did not have it retested (7.4 vs 6.1 mmol/l; $p > 0.001$). The majority of those who retested their cholesterol (58.3 %) reported a lower cholesterol level at their last testing, while a smaller group (10.8) reported an increase, and the remaining subjects (30.9 %) reported no change. Overall, the group retesting cholesterol levels reported an average reduction in cholesterol level of 1.0 mmol/l (paired $t = 8.47$; $p < 0.001$). Successful cholesterol reduction was not associated with any demographic variables.

Perceived benefit of the campaign: In 1988, the large majority of participants (78.9 %) reported having perceived the screening program and nutrition counselling to be very informative and beneficial. A year later, the overall rating of the campaign was somewhat lower (paired $t = 3.61$; $p < 0.001$; see Table 2), but the large majority (64.7 %) still reported the campaign to have been very informative and beneficial. Whether participants perceived the campaign as positive or not was independent of a participant's cholesterol level and his/her reaction to the test result. As in 1988 (Matthiesen et al., 1990), we found, that older participants (i.e. 56 years or older) in 1989 were more positive towards the campaign than were the younger ones (74.2 vs 57.3 %; $p < 0.001$), and that participants with only mandatory education (9 years or less) were more positive towards the campaign than those with higher education (73.7 vs 63.2 %; $p < 0.01$).

Reaction to the test result: Most participants reported being pleasantly surprised or having no reaction (70.3 %) when receiving test results in 1988. However, a substantial group, 29.7 %, reported becoming somewhat alarmed when receiving results, and 6.9 % reported becoming quite or very alarmed. This reaction was strongly associated with participants' cholesterol level ($r = .64$). When controlling for differences in baseline cholesterol levels, we found that females reported feeling more alarmed about their test results than did males ($p < 0.05$), and younger participants more alarmed than older ones ($p < 0.01$).

Participants were also asked how they felt about their test results at the time of the surveys ("current" reaction). As can be seen in Table 2, there was hardly any difference in mean values, and these two measures (reaction at the time of receiving the test result and "current" reaction) were highly correlated ($r = .81$ in 1988 and $r = .77$ in 1989).

Table 2: Gender differences in 1988 and 1989 perceptions of and reaction to the cholesterol screening program and intentions to change dietary habits

	1988		1989	
	Males	Females	Males	Females
Perceived benefit from campaign [1 4]	4.7	4.7	4.5	4.5
Immediate reaction to test results [6]	1.8	2.3***	1.7	2.1***
"Current" reaction to test results [2 4]	1.9	2.2***	1.6	2.1***
Intention to eat more healthily [3 6]	2.4	2.6*	2.0	2.1

Gender difference within year: * $p<0.05$; ** $p<0.01$; *** $p<0.001$
Change from 1988 to 1989: Males: [1] $p<0.05$; [2] $p<0.01$; [3] $p<0.001$
Change from 1988 to 1989: Females: [4] $p<0.05$; [5] $p<0.01$; [6] $p<0.001$

Table 3: Proportion of participants who in 1989 reported to be pleased or alarmed about their latest cholesterol test results*

	Pleased	Alarmed	N
Participants who did not retest their cholesterol level	87.2 %	12.8 %	149
Participants who retested and had reduced cholesterol level	86.3 %	13.7 %	73
Participants who retested and reported no change in cholesterol level	57.1 %	42.9 %	42
Participants who retested and reported an increase in cholesterol level	50.0 %	50.0 %	14

* 40 subjects had missing value on one or more of the variables included in this table

At the time of the 1989 survey, 20.2 % reported their "current" reaction to be one of fear, while 3.2 % said they were still quite or very alarmed. Subjects who in October 1989 reported retesting their cholesterol and finding no reduction, or an increase in cholesterol compared to the measure taken in October 1988, reported feelings of alarm more frequently than did participants who had experienced a reduction in cholesterol level, or who had not had their cholesterol remeasured (see Table 3). Again, comparing men and women, we found that women were significantly more frequently alarmed than were men, even when controlling for retesting and changes in cholesterol levels ($p < 0.001$).

Intention to change eating behavior: At baseline, after receiving test results, 50.5 % answered that it was likely that they would adopt a more healthy eating pattern in the future. Those with the highest cholesterol levels reported most often that they intended to improve their dietary habits ($r = .25$). Controlling for cholesterol levels, none of the demographic variables nor participants' perception of, or reaction to the campaign were significantly associated with this measure of behavioral intentions. One year later, 19.2 % still claimed that they intended to improve their dietary habits.

Changes in eating pattern: At the follow-up survey in 1989, participants reported to have made a number of healthy changes in their eating habits. As can be seen in Table 4, a substantial proportion of both men and women reported eating more fish and low-fat dairy products and less high-fat dairy products, eggs, and high fat snack products. Creating a sum-score based on the self-reported eating changes presented in Table 4, we found that baseline intentions to change eating patterns and baseline cholesterol levels significantly predicted this dietary change score. These two variables accounted for 16.2 % of the observed variance in the change score (stepwise multiple regression). None of the other independent variables presented in this paper contributed significantly in addition to intentions and baseline cholesterol levels.

DISCUSSION

This study was designed to investigate how subjects participating in a local cholesterol screening campaign in the City of Bergen, Norway perceived the screening and the dietary counselling provided, and to what extent participants reported having implemented dietary changes one year later. The results indicate that the large majority of participants felt they had benefited from the campaign (it was reported to be informative and beneficial). Unlike most health education efforts, which seem to cater primarily to those who are highly educated, this campaign was perceived as

Table 4: Changes in dietary habits reported at follow-up: Proportion of males and females who reported to eat more or less of specific food items

		Males	Females
Ate/drank more:	Low-fat milk (1 % fat)	19.8 %	14.6 %
	Skimmed milk	14.4 %	15.9 %
	Light margarine	14.4 %	19.9 %
	Vegetable oils	5.4 %	11.3 %
	Baked/poached fish	33.5 %	39.1 %
Ate/drank less:	Whole-fat milk	22.8 %	13.2 %*
	Cheese	9.6 %	12.6 %
	Eggs	35.3 %	38.4 %
	Cakes/sweets	18.6 %	27.2 %
	Butter	23.4 %	22.5 %
	Potato-chips/salty snacks	9.6 %	13.9 %
	Hot dogs/hamburgers	24.0 %	26.5 %
	French fries	14.4 %	19.9 %

* $p < 0.05$

beneficial more often by those with the least formal education. While 30 % reported becoming somewhat alarmed when told of their test results, only 3 % reported still feeling quite or very alarmed one year later. Those who had experienced no change or an increase in their cholesterol levels since participating in the campaign, reported feeling alarmed at follow-up more often than did other participants. Women reported feeling more alarmed than did men, and younger participants more than older participants. After receiving their test results, half of the participants claimed that they intended to adopt a more healthy eating pattern. Those with the highest cholesterol levels reported more often than did others that they intended to improve their dietary habits. At the follow-up survey, a substantial proportion of both men and women reported eating more fish and low-fat dairy products and less high-fat dairy products, eggs, and high fat snack products. Baseline intentions to change eating patterns and baseline cholesterol levels significantly predicted these dietary changes, while demographic factors did not seem to be important with regard to implementing dietary changes.

These results indicate that having one's cholesterol measured can serve as an important motivational factor for making dietary changes which can reduce the overall dietary fat intake. In this study, those with highest cholesterol levels most strongly intended to reduce their fat intake, and one year later they reported more dietary changes than did participants with lower cholesterol levels. Public cholesterol screening campaigns can, however, also have negative consequences. In this study we found that a large proportion of the participants reported becoming alarmed when they first received their cholesterol test results. Fear-arousal has been found to have a positive impact on subjects' attitudes and behaviors when and if the subjects are provided with concrete and realistic behavioral alternatives which will lead to reduced risk (Zimbardo et al., 1977; Sutton, 1982). if such alternatives are not provided, fear arousal most often has a negative impact (Zimbardo et al., 1977).

A year after the initial cholesterol screening, one out of five participants still reported his/her main reaction being one of fear. Those subjects who reported feeling most alarmed were those who within the past year had had their cholesterol remeasured and found that the cholesterol level had increased or not changed at all. These subjects might not have received sufficient information regarding how they could change their diet in order to reduce risk. Alternatively, they might have made appropriate dietary changes in between cholesterol measurements which in turn may have

led to a reduced serum cholesterol level. However, due to the individual variability and inaccuracy inherent in the rapid cholesterol test method, this change in cholesterol level may not have been detected. Even though only a small proportion of the participants reported being quite or very alarmed at follow-up, the use of cholesterol screening as a tool to lower the dietary fat intake in the general population could induce unnecessary fear and concern in a large number of people.

In order to avoid such potentially negative outcomes of cholesterol screening, it is important that screening is conducted by qualified health personnel only, and that appropriate counselling is provided. Such counselling should include information regarding the limitations of the test (such as individual and seasonal variation of the cholesterol level), and a distinction between cholesterol levels as a risk factor in a population versus individual risk assessment. Counselling should also include appropriate dietary recommendations (whether the person is found to have high or low cholesterol level) focusing on skills necessary to implement the recommended changes. Furthermore, other risk factors for coronary heart disease such as smoking, high blood pressure and physical inactivity should be addressed at the same time. Particular attention should be given to those who appear alarmed or concerned when receiving their test results (particularly women and younger subjects) and follow-up consultations are recommended.

Participation-rate in this study was high compared to most other studies relying on mailed questionnaires (the cohort consisted of 90 % of the overall eligible population). The design employed in this study was, however, a one-group only design, and participating subjects were self-selected and therefore likely to be more health conscious and health interested than the general adult population. Finally, except for the baseline cholesterol level, all measures reported in this study were selfreported. Thus it is not possible, based on this study alone, to conclude that public cholesterol screening programs are an effective way of fostering dietary changes in a population.

Results from this study indicate that cholesterol screening is seen as a popular measure by participants, that participants with high cholesterol levels report an intent to make dietary changes, ant that, one year later, these participants report having implemented a number of health enhancing dietary changes. A smaller, but substantial proportion of the population did, however, report becoming alarmed when receiving their test results. Subjects who did not experience a reduction in cholesterol level over the next year remained alarmed. Thus, cholesterol screening has the potential of creating fear and concern and should, for this reason, be used by trained health personnel only, and accompanied by appropriate counselling.

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John L. Andreassi: **Psychophysiology: Human behavior and physiological response.** 2nd edition. Lawrence Erlbaum Associates, Hillsdale, New Jersey, Hove and London, 1989, P. 472.

This textbook opens the intricate matter of psychophysiology to novices whether they are undergraduate or graduate students. Unlike other books on psychophysiology, it is not an overview of techniques nor a compendium of facts but it rather presents specific concepts which stand behind the investigations of the relationships between the mental processes and bodily changes.

The book has fifteen chapters. Chapter 1 deals with definitions of psychophysiology, its history and contemporary status. Chapters 2 to 12 introduce the readar to psychophysiological investigations of various physiological processes. Each of these chapters gives some fundametal information about the basic physiology of the respective function, describes the methods and techniques of measurement and presents specific psychophysiological problems pertinent for this function. The book can be studied both front to back or back to front or the reader can choose some chapters only.

The emphasis is given in the book to the brain electrical activity. Chapters 2 to 7 introduce the reader to psychophysiological investigations of the electroencephalogram and various types of the event related potentials such as evoked responses including the P300 component, the contingent negative variation and the readiness potential. Chapter 8 deals with muscle activity, Chapter 9 with the electrodermal activity and Chapter 10 with pupillary responses and eye movements. In Chapter 11 the relationship between heart rate and various psychological processes is presented comprehensively for different psychological conditions, i. e. reaction time task, verbal learning, problem solving, imagery and meditation, perception, orienting response, emotion, motivation and conditioning. Chapter 12 deals with peripheral vascular responses and blood pressure changes in various mental states. Chapters 13 and 14 are intended for readers interested in the practical use of the psychophysiological approach in patients with psychiatric or neurological diagnosis and by detection of deception. Chapter 14 gives a detailed description of various applications of biofeedback, i. e. the EMG biofeedback in psychiatric and neurological patients, the EEG biofeedback in the treatment of epilepsy, blood pressure biofeedback in the treatment of hypertension and the blood volume and the temperature biofeedback in migraine headaches. Chapter 15 brings the reader to the most influential concepts of psychophysiology which have directed the psychophysiological research for several decades, and it is especially valuable for readers entering psychophysiological research. Most of the concepts (law of initial values, cardiac-somatic coupling, orienting-defensive responses, habituation and rebound, autonomic balance, individual vs. stimulus response specifity) refer to the vegetative system while only „conceptualizations concerning the event-related potentials" are mentioned for the brain activity. this striking difference has its objective basis in the unusual diversity of findings concerning the relationships between the parameters of brain electrical activity and various psychological processes. Three appendices provide the reader with an overview of the environmental factors which influence both the mental and physiological functions and with some practical questions of the psychophysiological recordings.

The experimental findings are presented with a great deal of clarity and they are frequently illustrated with figures. I would appreciate a chapter about relationships between respiration and various mental states and behaviour because respiration is tightly coupled to the central and vegetative parameters and various respiratory parameters change as the mental state changes. However, going too far by presenting many different physiological functions could hardly bring a newcomer closer to psychophysiology than does Andreassi with this book.

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