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Smoking cessation: some determinants of motivation and success

M.H.M. Breteler

Smoking cessation: some determinants of motivation and success

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Een wetenschappelijke proeve
op het gebied van de sociale wetenschappen

Proefschrift

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Preface

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Chapter 1. General Introduction

1.1. Introduction

This study concerns itself with cessation of cigarette smoking. In the introduction the reader is acquainted with general characteristics and prevalence of smoking behavior. Apart from this, attention is given to the hazardousness of smoking for health. A superficial history of smoking cessation interventions is then provided, leading to the research questions addressed in this study. The term "smoking" is used here as referring to cigarette smoking in particular or as a generic term for all kinds of smoking behavior. If necessary, distinctions between the smoking of cigars, pipe or cigarettes will be explicited.

1.2. General Characteristics of Smoking

When observing somebody smoking, it is found that smoking can be characterized by a number of parameters involved in the intake of nicotine: the number of puffs, the volume of the puffs, the depth of inhalation, the volume of the inhalations and the ratio smoke/air in the inhalations (Benowitz, 1986; Henningfield, 1984). These parameters are partly influenced by the type of product smoked: cigar, pipe or cigarette. Especially the smoking of the latter product has been investigated thoroughly during the last thirty years. Cigarettes vary widely in tobacco acidity, nicotine contents, length, and filter characteristics, each influencing the smoking behavior (see USDHHS, 1980).

By now it has become clear that smokers regulate their nicotine intake (i.e. maintain a characteristic level of nicotine in the body). Yet considerable difference in nicotine intake exists within and between smokers (McMorrow & Foxx, 1983).

Besides pharmacological factors however, psychological factors appear equally important in smoking behavior. Motives for smoking reported by smokers can fairly consistently be reduced to six factors: smoking as a habit, for stimulation, as an addiction, for pleasure and relaxation, for handling, and for tension reduction. (Leventhal & Cleary, 1980). Although individual smokers thus experience smoking as a contribution to their well-being, this appears to be mainly illusionary (Costa & McCrae, 1982). Dose-response studies with nicotine apparently support the validity of the reported motives, i.e. smoking for relaxation and tension reduction. In a stress test smokers do better when allowed to smoke high nicotine cigarettes as compared to low nicotine-

or non-smoking conditions, yet they do not perform better than non-smokers (Schachter, 1980).
The experienced contribution of smoking to well-being appears to be an ambiguous figure-ground effect where selective attention is given to the immediate effects of the smoking act.
A general review of correspondences with demographic variables goes beyond the purpose of this introduction. Yet three conspicuous relationships should be mentioned here: more men smoke than women do, heavy smoking goes with heavy drinking and smoking proportionally occurs more in the lower classes than in the upper classes (Cummins, 1981; Shopland & Brown, 1987; USDHHS, 1986).
In summarizing, it should be clear that under the generic term "smoking" a complex of processes is gathered, processes which are affected by pharmacological, psychological and psycho-social factors.

1.3. Prevalence and consumption in the Netherlands

Prevalence of smoking in the Netherlands has been measured by means of cross-sectional self-report studies. The percentage of male smokers older than 15 years of age has decreased from 90 % in 1958 to 42 % in 1986. Among women 29 % smoked in 1958, increasing to 42 % in 1972 and decreasing again to 34 % in 1986 (Foundation for Smoking and Health, 1987). The decrease in the prevalence in the population should not be attributed to an increasing number of quitters but to the increasing number of young men who do not take up smoking (Van Reek, 1984). Since 1980, prevalence developments among younger women from 15 to 34 years of age have been nearly identical to those of young men, suggesting an emancipatory effect.
The sales of tobacco in the Netherlands is registered by means of tax tags adhered to every wrapping of tobacco. The sales of these tags indicates an increase of annual consumption per capita from about 1 kilogram in 1946 to 3 kilogram in 1981 (Van Reek, 1984). During the latest years the total consumption of tobacco has stagnated. However, the sales of cut tobacco for hand rolled cigarettes keeps on rising, possibly due to the raising prices of tobacco (with manufactured cigarettes being more expensive).
The estimated daily individual consumption of cigarettes (both hand rolled and manufactured) based on these figures increased from 14 cigarettes in 1970 to 21 cigarettes in 1986 (Foundation for Smoking and Health, 1987). Survey research based on self-reports consistently has

reported lower daily consumption figures, indicating that the Dutch cigarette smokers underestimate their consumption.

1.4. Hazardousness for health

The annual mortality in the Netherlands caused by smoking is estimated to be about 18000 (Foundation for Smoking and Health, 1987). Twenty five years ago the British Royal College of Physicians (1962) presented one of the first reports which indicated the relationship between smoking and illnesses. Since then various large scale studies (Doll & Peto, 1976; Friedman, Petitti, Bawol & Siegelaub, 1981; Rogot & Murray, 1980) have extended the evidence that smoking causes mortality by various diseases, the main ones being cardiovascular diseases, chronic obstructive lung diseases (COLD) and lungcancer. The World Health Organization (1979) estimates that smoking causes 90 % of lungcancer mortality, 75 % of COLD mortality and 25 % of ischaemic heart disease mortality. More detailed information on these issues are provided in the yearly reports of the US Surgeon General (1982, 1983, 1984).

1.5. Smoking cessation

In 1983 more than 30 % of the Dutch population of 21 years of age and over were ex-smokers (corrected percentages, van Reek, Drop & Adriaanse, 1985). The majority of ex-smokers indicate to have quit on their own (88 %). A comparable proportion of smokers say to prefer quitting on their own if they would quit (85 %; Foundation for Smoking and Health, 1986). Although smoking cessation has mainly been investigated in detail among participants of treatment programs, these investigations have revealed various events in the process of smoking cessation which may be assumed to occur for all smokers.

Current smoking cessation theories distinguish various stages in the process of smoking cessation, roughly divided in three stages: contemplation to change, action, and maintenance (Mermelstein, Cohen, Lichtenstein, Baer & Kamarck, 1986).

The novice quitter may experience various withdrawal symptoms, such as irritability, coughing, constipation, sleeplessness and craving for cigarettes (Shiffman & Jarvik, 1976; Schneider, Jarvik, Forsythe et al., 1983). Although weight loss is also reported (Bosse, Garvey & Costa, 1980), weight gain is an often mentioned consequence of smoking cessation. This gain is apparently caused by a change of dietary preferences in the direction of increased carbohydrate intake, especially sugar. Also

the amount of aerobic exercise engaged in influences weight gain (Rodin, 1987).

1.6. Smoking cessation interventions

Since the sixties various smoking cessation interventions have been developed in order to ameliorate the health status of the participants. Pioneering behavioral scientists regarded cessation mainly as an extinction of learned behavior. They gave little, if any, attention to pharmacological and social factors. Current interventions do acknowledge the importance of these latter factors, nicotine chewing gum and social support interventions being examples of this acknowledgement (Jamrozik, Fowler, Vessey & Wald, 1984; Lichtenstein, Glasgow & Abrams, 1986).

Intervention programs nowadays consist of broad-spectrum treatments, combining a number of supposedly effective strategies. The main strategies involved use aversion therapy, self-control methods, health education and hypnosis (Schwartz, 1987). To date, no particular program has proven to be consistently superior in outcome compared to others. Although short term success rates of 80 % are no exception, relapse is considerable and one year follow-up success rates range between 20 and 40 %. Only recently large scale studies have begun to investigate various factors among self-quitters (DiClemente, Prochaska & Gibertini, 1985).

1.7. Research questions

In the current report emphasis is put on patients with cardiovascular and pulmonary complaints. This group of smokers clearly benefits from smoking cessation, as their mortality risk decreases when they stop smoking. Smoking myocard infarction patients who stop smoking have a 50 % lower mortality than those who continue (Friedman et al., 1981). In general smoking cessation is also followed by an amelioration in cardiopulmonary functioning (USDHHS, 1984).

Two questions were investigated:

- What is the surplus value of a behavior-therapeutic program with motivation enhancing interventions compared to a non-specific counseling (a motivation neutral treatment) with regard to smoking cessation?

- What factors (behavior characteristics, complaints and situational circumstances) are related to motivation to stop

smoking and actual smoking cessation among patients with cardiovascular and pulmonary complaints?

The second question was also investigated in a non-patient population, leaving out the restriction to patients.

1.8. Contents

This report can be divided in two parts. The first part concerns itself with the treatment of smokers who wish to quit. The second part reports on determinants of motivation to change smoking behavior among both patients and non-patients.

Comparison of effects of evaluation studies is hampered by differences in methodology. In chapter 2 (Smoking cessation studies: a methodological comparison) attention is given to the consequences of the variety in outcome criteria, treatment attrition, handling of missing data and the repeated use of significance tests. With these considerations in mind a meta-analysis has been made with regard to the use of nicotine chewing gum (NCG), a recent development in smoking cessation intervention research. Chapter 3 (Smoking cessation with nicotine gum: a meta-analysis of placebo-controlled intervention studies) focuses on four questions with regard to nicotine gum:

- Does nicotine gum lead to better treatment outcome compared to placebo gum?
- Are withdrawal symptoms reduced to a greater extent in users of nicotine gum than in users of placebo gum?
- Is the efficacy of the gum reflected by correspondences of outcome and withdrawal symptoms with gum use?
- Is there a difference in the occurrence of side-effects between users of NCG and users of placebo gum?

Chapter 4 (The development and evaluation of a behavior therapy for smoking cessation) provides a concise review of the smoking cessation literature. Apart from this, the development of three versions of a behavior therapy program is illustrated and outcome is shown. The fifth chapter (Smoking cessation programs: What is the crux?) reports on the design of the intervention study. Two treatment conditions (behavior therapy vs. non-specific counseling) have been compared single blind, with measures taken before and at the end of treatment, as well as at 4, 13, 26, and 52 weeks follow-up. Also some short term results of both treatment conditions are shown. In chapter 6 (Smoking cessation in out-patients: outcome and prediction of smoking status)

long term success rates are presented as well as predictors for smoking status at 52 weeks follow-up. The relevance of psycho-social variables measured at 52 weeks follow-up is discussed.

The chapters mentioned above focused on the action and maintenance stages of smoking cessation. Little attention has been given to the stage of contemplation to change, the important initial stage in the process of smoking cessation. This stage has been investigated among both patients and bank employees, with emphasis on the motivation to change smoking behavior. A multifactorial model has been developed in accordance with current theories, incorporating variables of the pharmacological, psychological and psycho-social domain. This model is tested in a cross-sectional design. Chapter 7 (A multivariate model of smoking cessation, LISREL analysis compared to multiple regression analysis) compares multiple regression analysis to linear structural relationships (LISREL) analysis with regard to their applicability to test the model. This is done using data of bank employees. The solution provided by LISREL is discussed in the light of smoking cessation theory. Chapter 8 (Motivation to change smoking behavior: a revised model) concerns itself with a revised model, again tested among bank employees. Chapter 9 (The motivation for change of smoking behavior: fitting a model for patients with cardiovascular and pulmonary complaints) reports on the testing of a similar model for patients. In chapter 10 (Summary and discussion) the results of the various studies are considered with regard to their consequences for smoking cessation theory.

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Chapter 2. Smoking cessation studies: a methodological comparison

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2.1. Introduction

Since the beginning of the evaluation of smoking cessation therapy such studies have been accompanied by the call for sound methodology. In one of the first reviews Bernstein (1969) summarized the main methodological problems. In those days studies sometimes presented only end-of-treatment results, based on few subjects. Evaluation has been ameliorated distinctively since. Randomized trials, control and attention-placebo designs with longterm follow-up have become customary characteristics of evaluation studies.

Yet evaluation criteria still differ considerably among studies. Midanik, Polen, Hunkeler et al. (1984) compared three criteria used for measuring smoking status: interval of non-smoking, type of tobacco smoked and amount of tobacco smoked. Results were affected only slightly by the method used. However, the authors studied only a single interval duration. Shipley, Rosen & Williams (1982) reported on the use of varying durations of intervals. 24 Hours as well as one week of non-smoking was used as criterion for therapy success. Especially at the end of treatment when subjects resume smoking little by little (e.g. three days of the week), the former criterion may lead to distorted, positive results. Nowadays pharmacological validation of self-reports by means of thiocyanate (Abueg, Colletti & Rizzo, 1986) or cotinine (Fertig, Pomerleau & Sanders, 1986) form the state-of-the-art in outcome measurement. McMorrow & Foxx (1985) provide a thorough discussion on the various pharmacological measures available. They show that even these measures by no means lead to identical results.

When reviewing smoking cessation studies these differences in evaluation criteria constitute a serious problem. In the most recent development of review techniques, meta-analysis (Hedges & Olkin, 1985), these differences are accounted for and their influence is analyzed. The clearest advantage of meta-analysis over usual review techniques is its estimation of effect size. The conclusions of a common literature review remain relatively subjective, according to the interpretation of the reviewer. Although the latter is not different for meta-analysis, the decisions taken are based on well-circumscribed procedures. Yet even

this approach becomes powerless if basic methodological issues remain unsolved. In this study we tackle such an issue: the handling of data. In particular we focus on the treatment of subjects who drop out of therapy, the treatment of missing data, and the consequences of repeated follow-up measurements (see McFall, 1978 for a discussion on the interpretation and generalizability of results).
It is an exception that all participants of a smoking cessation therapy visit all sessions. It has become convention in evaluation studies to distinguish two types of participants: dropouts and completers. Dropout rates of up to 50 % have been reported in a review by Leventhal & Cleary (1980).
Especially in follow-up measurements the number of valid data decreases over time. In a study among 28 British smoking cessation clinics Raw & Heller (1984) reported an average contact rate of 65 % at one year follow-up. Actual contact rates varied from 20 to 100 %.
These studies illustrate that dropout and missing data are important issues in smoking cessation evaluation studies. Note that they are equally important in evaluation studies concerning various other addictions. Decisions about these issues determine the number of participants in the analyses and the status assigned to them. As the discriminative power of test statistics is dependent upon the number of observations (Cohen, 1979), careful decision making is of paramount importance.
This article is written with a dual purpose. (1) To make an inventory of the variety of decisions that may affect the validity of evaluation studies. (2) To suggest alternative procedures which can facilitate future comparison of results.

2.2. Dropout

With regard to dropout various researchers use different criteria which makes comparison of results difficult. These criteria are given in table 2.1. The studies in this table represent by no means an exhaustive overview of the smoking cessation literature but serve as examples of data treatment. They suffice to illustrate the points to be made.
Buchkremer (1982) considers every participant who's not present at all sessions as dropout, while Fagerstrom (1982) does so for those who are only present at the first session. Barnes, Vulcano & Greaves (1985) do not distinguish between either dropouts or completers. Thus they circumvent an arbitrary decision.

Table 2.1. Characteristics of smoking cessation studies, including treatment of dropout and missing data.

study	conditions	N	dropout criterion	missing data treatment	% success (at latest f-u)
Barnes et al., 1985	predictor study	166	attendance rate	no info, apparently excluded	36 (6 months)
Best & Suedfield, 1982	a. REST	14	not all sessions present	excluded	53 (12 months)
	b. self-management	15			59
	c. REST + s.-m.	15			40
Buchkremer, 1982	a. behavior ther. + posit. expectation	41	not all sessions present	considered as smokers	total 27 (36 months)
	b. behavior ther.	40			
	c. short beh. ther.	39			
Christensen & DiGiusto, 1982	a. 6 hours of sensory deprivation	20	out of confinement before scheduled	estimated means entered	20 (6 months)
	b. 12 hours of s.dep.	21.			24
	c. 24 hours of s.dep.	15			0
	d. 24 hours of social isolation	16			31
Corty & McFall, 1984	a. rapid smoking	18	less than 75% of sessions present	value at previous f-u point entered	23 (9 months)
	b. response prevention	21			7

Table 2.1. Characteristics of smoking cessation studies, including treatment of dropout and missing data (continued).

study	conditions	N	dropout criterion	missing data treatment	% success (at latest f-u)
Etringer et al., 1984	a. enriched cohesion		no info	no info	
	-saturation	19			32 (12 months)
	-nicotine fading	22			45
	b. standard cohesion				
	-saturation	16			6
	-nicotine fading	15			40
Fagerstrom, 1981	a. treatment +		only one	no info	
	nicotine gum	total	session present		63 (6 months)
	b. treatment +	100			
	placebo gum				45
Hajek et al., 1985	a. therapist		no criterion	considered as smokers	
	oriented program	132			17 (12 months)
	b. group				
	oriented program	138			28
Hall et al., 1985	a. low contact with		no criterion	no info	
	nicotine gum	43			37 (12 months)
	b. behavioral treatment	36			28
	c. combined (ng + bt)	41			44
Killen et al., 1984	a. nicotine gum	22	different for	apparently	23 (10.5 months)
	b. skills training	20	various subjects	no missing data	30
	c. skills tr. + nic. gum	22			50

Table 2.1. Characteristics of smoking cessation studies, including treatment of dropout and missing data (continued).

study	conditions	N	dropout criterion	missing data treatment	% success (at latest f-u)
Lando, 1981	a. two stage program		no dropout	excluded	
	- intensive therapist contact	24			46 (12 months)
	- minimal ther. cont.	20			17
	b. three stage program				
	- int. ther. cont.	23			19
	- min. ther. cont.	33			19
Pomerleau et al., 1983	predictor study	100	no info	considered as smokers	30 (12 months)
Rabkin et al., 1984	a. hypnosis	48	not present	considered as smokers	19 (12 months)
	b. health education	41	at follow-up		22
	c. behavior modification	46			17
	d. control	33.			0
Schneider et al., 1983	a. nicotine gum	30	no info	survival analysis	30 (12 months)
	b. placebo gum	30			20
Walker & Franzini, 1985	2x2x2		no info	no info	
	a. satiation vs. focused smoking	total			total
	b. feedback y/n	64			27 (9 months)
	c. boostersession y/n				

The same variation exists in data analysis: dropouts may be in- or excluded, or replaced by estimates. Assuming the dichotomy of completers and dropouts various decisions concerning analysis are possible. Figure 2.1 points out twelve decision pathways. It classifies all possible decisions, both for dropout and missing data treatment. We shall describe the conventional decisions using the evaluation studies from table 2.1 as an example. It is very common to classify completers with missing data as smokers (decision 4; Buchkremer, 1982; Hajek, Belcher, Stapleton, 1985; Pomerleau, Adkins & Pertchuk, 1983). Yet other options are also in use. Corty & McFall (1984) use the results accomplished in the previous f-u measurement (decision 5). Christensen & Di Giusto (1982) replace missing values with estimated means of consumption (decision 5). Other studies exclude completers with missing data from the analysis (decision 6; Barnes et al, 1985; Lando, 1981).

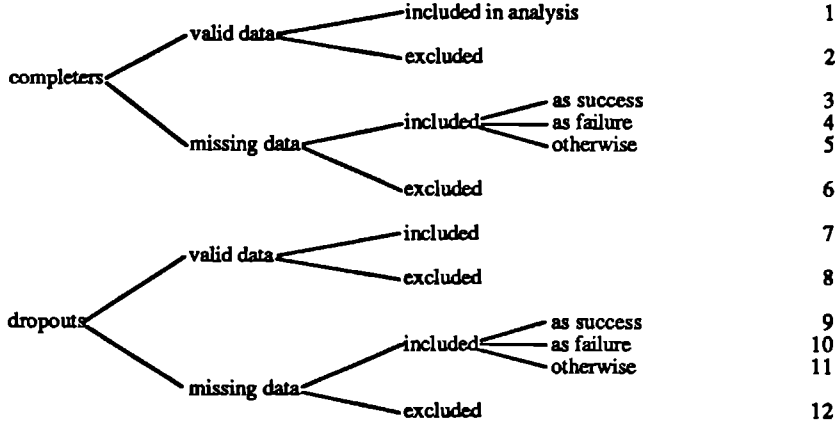

Figure 2.1. Decision tree for treatment of dropouts and subjects with missing data.

Analysis of dropout data appears to be similarly confusing. Only few studies include dropouts straightforward in their analysis (decision 7; Barnes et al, 1984; Midanik et al, 1984). Many researchers exclude them apriori from analysis (decision 8; Fagerstrom, 1982; Best & Suedfield, 1982; Lando, 1981). Mostly dropouts provide missing data. These can be

included in the analysis as smokers (decision 10; Hajek et al, 1986) or otherwise (decision 11). Finally they can be excluded (decision 12). We have not illustrated all decisions possible because authors often do not distinguish between dropouts with valid or missing data.

From the description above it follows that a wide variety exists in the treatment of data. Distinction has been made between analysis with regard to efficiency and analysis with regard to program effect. The latter has been a reason to exclude dropouts from analysis in accord to be better able to detect a program's impact (Best & Suedfield, 1982). This can only be justified if can be shown that dropout is caused by reasons unrelated to the treatment conditions. Otherwise it means selection of subjects and negligence of a potential dropout-producing character of the program. A clear example to illustrate this issue is the study by Midanik et al. (1984). They found that participants in the Kaiser Permanente program who were present at less than half of the sessions had a success rate at one year follow-up of 10 %. The program's success calculated over only completers (all sessions present, 19 % of the participants) shows a success rate of 57 % at one year follow-up. Exclusion of dropouts would lead to a distorted view on the effect of the program. Another objection against exclusion is that it means a violation of randomness, the latter being an assumption for most tests of significance (Cook & Campbell, 1979).

If dropout is included in the analysis this is meant to be conservative. Dropouts often are regarded then as smokers. Although this method is preferable to the exclusion of dropout it may also lead to bias in the comparison of two or more conditions. This is the case when dropout does not appear equally divided between all conditions. In an interesting study of Hall, Tunstall, Rug et al. (1985) there were no dropouts in a combined nicotine gum-behavior therapy condition. This condition was reported to be superior to other conditions. At follow-up this superiority would disappear if dropouts would be excluded. No further information is given about the treatment of dropout. Without knowing whether the dropout was related to the treatment conditions (or e.g. caused by illness) we must question the validity of the results.

So, if we accept the dichotomy of dropouts vs. completers the occurrence of dropout can affect the results apriori. As similar problems are encountered with regard to valid and missing data we shall discuss this matter below in more detail. We summarize the foregoing by noting that little consensus exists about how to deal with dropout. Results of tests of significance can only be compared directly if the analysis

decisions (figure 2.1) are identical. Consequently comparison of outcome over various studies is a hazardous enterprise without knowledge of the decisions taken.

2.3. Missing data

Various methods have been developed to handle missing data. In evaluation studies subjects with missing data mostly are regarded as smokers, as a conservative measure. Yet, in a similar way as with regard to dropout, differences between conditions in the occurrence of missing data may lead to biased results. Table 2.2 shows the situation most researchers face when evaluating a treatment program at a certain point of time. Participants from two or more experimental conditions may have valid or missing data. A chi square can be calculated for this table. Whenever this value is significant the conditions differ in their composition of valid and missing data. In that case we may conclude that any decision concerning missing data will affect results apriori.

Table 2.2. Crosstabulation of condition by quality of data.

Data	Condition		
v	1	.....	n
Missing	f_{m1}	.....	f_{mn}
Valid	f_{v1}	.....	f_{vn}

f_{ij}: frequency of missing (i=m) or valid (i=v) data for condition j (j=1,2,..,n).

The same logic applies to the decisions concerning dropout. The picture becomes considerably more complex if the distinction of dropout-completers is nested into the same table (yet this illustrates reality best). If chi square is significant decisions with regard to dropout will affect the percentage of missing data et vice versa.

A solution to the problem of missing data is offered by Cook & Campbell (1979). They suggest to check whether the subjects who are lost to follow-up are comparable on pretest data to those who provide valid data. If so, the remaining data can act as pars pro toto.

Another, more elegant solution when measuring success rate is survival analysis. Its name refers to its original domain: survival studies. In such studies subjects may be lost to follow-up without certainty about their actual status (dead or alive). In smoking cessation studies this technique can be used, replacing "death" by "relapse to smoking". Once a participant has reported smoking at follow-up, he is considered smoking

for the remaining of the study. Estimates can be made about the curve of relapse, and the equality of relapse distributions over various treatment regimens can be tested. This method controls for the interdependence of measurements: e.g. the probability that a participant of a smoking cessation therapy remains abstinent for at least three months is related to the probability that he has remained abstinent for at least one month. Until now the use of survival analysis in smoking cessation research has been very limited (Schneider, Jarvik & Forsythe, 1983). Its use means a very strict criterion of success, because non-smoking participants are considered successful only if they have never smoked since the end of treatment.

2.4. Repeated measurements

We need to be aware that the problems with dropout and missing data have been described for a single moment in time. In reality most researchers plan several measurements: at the end of treatment, at one month, and at three, six and twelve months follow-up. Tests of significance are mostly applied using an alpha of five percent. (alpha = the probability of a type I error: no difference in outcome exists when the researcher assumes that it does exist). With five repeated tests, each with alpha = 0.05, the overall probability of erroneously assuming a difference between treatment outcomes increases to 0.14. To attain an overall alpha of 0.05 the significance level of each test should be 0.016 (Pocock, 1983). Note that this criterion can and should be calculated before the start of any study. These facts are wellknown in statistics (cf. post hoc testing in analysis of variance). Apparently they have remained unknown to many researchers in the field of smoking cessation. Unfortunately this means that conclusions of many studies about the effects of certain treatments may need to be restated.

A very informative study is presented by Hjalmarson (1984). She states that patients treated with nicotine chewing gum had a significant better outcome than those receiving placebo throughout all four follow-up points of the study. She uses the alpha = 0.05 criterion for each test. The overall risk of a type I error then is 0.13. This means that the risk of a false conclusion at at least one measurement is nearly one in seven. If Hjalmarson would have persued an overall type I error risk of 0.05, the alpha criterion of each test would have to be 0.018. She would then have concluded that patients treated with nicotine gum had a significant better outcome than those receiving placebo at the first three follow-up measurements. This example may serve as a warning

against a simple form of meta-analysis: the counting of significant p-values.

2.5. An Example

A study by Rabkin, Boyko, Shane & Kaufert (1984) constitutes a good example of the complexity of the issues we addressed until now. These authors provide an amount of information about the decisions concerning the analyses, which one would wish to encounter more often. The study assesses the effect of three methods to stop smoking: behavior modification, health education and hypnosis. A control group received a delayed treatment. A total number of 168 subjects participated in the study. Allocation to the conditions was randomized. The number of dropouts over the three conditions was comparable. Subjects were regarded as dropout when they dropped out during the program or did not return for follow up.

Actually this is a mix of treatment dropout and missing data (decisions 6, 8 and 12 of figure 2.1). The actual number of participants who left the treatment untimely cannot be discovered. Smoking behavior and related variables were measured at pretreatment, at three weeks after end of treatment and at 6 months after end of treatment. This is one of the few studies that explicitly show the importance of missing data treatment with regard to the determination of success rates. Success rates are given (1) based on the number of returned follow-up questionnaires (decisions 6, 8 and 12), (2) based on the number of completed questionnaires three weeks after end of treatment (decision 6, 8 and 12), and (3) based on the number of people initially randomized (decisions 4, 7 and 10). No significant differences turned up between the conditions using any decision. Yet the best success rates found varied from 22 to 36 percent. Note that the difference in reference groups for the computation of success rates implies different decisions regarding the treatment of missing data.

2.6. Conclusions

From the foregoing we derive five conclusions.

(1) The distinction between dropouts and completers is a burden rather than a help. A different approach of evaluation is needed, regarding the weak agreement in conceptualization of dropout, the manifold decisions taken in data analysis with regard to dropout and the possible interdependence of dropout and missing data.

(2) As dropout criteria are derived from attendance at sessions it seems better to consider this latter measure, especially because it can fulfill all functions of the dropout-completer criterion. Looking at figure 2.1 the use of attendance would mean that the decisions 7 to 12 will not occur anymore, which leads to more unanimity in data treatment. The relationship between attendance and outcome and the subject's pretreatment characteristics can be calculated. The attendance criterion provides more information and is better defined than the now misused concept of dropout. Comparison of program outcome is thus facilitated.
(3) As a whole there are little satisfying techniques to handle the problem of missing data. The application of survival analysis means a strict interpretation of the program outcome. Until the efficacy of relapse training has been shown it seems justified to use this cautious interpretation of outcome. The best remedy against biasing effects of missing data seems to be to spend an enormous amount of energy retrieving the desired information. This should minimize the influence of any decision taking with regard to analyses of the data. Anyhow, a check on the equal appearance of missing data should be obligatory.
(4) The overall risk of a type I error caused by repeated use of significance tests is considerably higher than alpha used separately with each test. Conclusions of studies that ignore this fact need to be read with caution.
(5) Different methods of data analysis lead to different statistical information. Reviewers have to take many decisions concerning the studies reviewed. Meta-analysis is considered as a "hard" review technique because its mathematical methods clearly delineate many decisions. The use of this technique cannot be justified pointing to its mathematical background only. Any meta-analysis meant to compare the effects of smoking cessation therapy will have to take into account the methodological variety of data treatment pictured above.
Although the conclusions above are tailored to the area of smoking cessation, the problems noted will also exist in other fields of therapy evaluation. This paper has several implications with regard to the policies used to date. The exclusion of dropouts from success rates should, in our view, become an obsolete policy. The repeated use of significance tests needs a presentation that takes into account the increased risk of type I error. It would even be better if the use of survival statistics would replace the contemporary use of chi square tests. More in general, the treatment of data often remains unknown. If we really want to communicate our results to fellow researchers it is

advisable to point to the various possible results and to provide ample information on the treatment of data (cf. Rabkin et al., 1983; Hjalmarson, 1984). As for staff training, students should be made aware that intervention research in the field of addiction is a complicated task, with often modest results. Fundamental knowledge of designs, statistics and power analysis is a necessary tool for any researcher who wishes to circumvent the methodological pitfalls of evaluation research. Only then one can attain a reliable view on the subject of evaluation studies: the effect of treatment conditions.

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Chapter 3. Smoking cessation with nicotine gum: a meta-analysis of placebo-controlled intervention studies.

M.H.M. Breteler, R. Rombouts & E.H.M. Mertens.

3.1. Introduction

For many years smoking cessation interventions have been qualified by the rather sobering remark of Leventhal & Cleary (1980): "It is simply better to do something than nothing". Pioneering behavioral scientists regarded smoking mainly as overlearned behavior, giving little attention, if any, to pharmacological aspects. Nowadays, smoking has come to be regarded as a biobehavioral process (Pomerleau, 1986).

Regulation of nicotine intake by smokers under various circumstances has been reported repeatedly by several authors (Benowitz, Hall, Herning et al., 1983; Pomerleau, Fertig & Shanahan, 1983; Russell, Jarvis, Feyerabend & Ferno, 1983). The phenomenon of regulation supports a pharmacologically oriented theory, which views smoking as an addiction to nicotine. Major advances with respect to nicotine addiction have been made by Russell and his collegues (Russell, 1978; Russell & Feyerabend, 1978; West, Jarvis, Russell et al., 1984). Smokers may develop a physical dependence to nicotine which is held, at least partly, responsible for withdrawal symptoms and concomittant relapse to smoking among quitters. Whereas psychological theories allow for a vast variety of interventions, pharmacological theories point to one major focus of intervention: nicotine. Until today, the major contribution of pharmacology to the field of smoking cessation intervention has been nicotine chewing gum. The consumption of nicotine chewing gum (NCG) during cessation should prevent the occurrence of physical, dependence related withdrawal symptoms and relapse to smoking. The introduction of the gum has not caused unequivocal enthusiasm. Feldman (1985) warns against a little critical evaluation of nicotine gum and questions the methodological flaws of studies on the gum. He also notes a declining benefit from NCG at long term followups. According to Blum (1984) publicity about the gum may serve as a reinforcer to the vision that smoking is a medical problem "with a non-individualized solution". In his view social reinforcements may be as important as nicotine in breaking the smoking habit and he doubts the effects of NCG. On the other hand, smokers who additionally chewed NCG have been reported to regulate the intake of nicotine (Ebert, McNabb & Snow, 1984). This result once again shows the role of nicotine in smoking and the phar-

macological activity of the gum. Although the nicotine in the gum is bound to an ion, which should prevent its release in the stomach, several studies report on gastero-intestinal side-effects (Puska, Bjorkvist & Koskela, 1979; Russell, Raw & Jarvis, 1980; Jamrozik, Fowler, Vessey & Wald, 1984) Another side-effect of NCG is addiction to the gum. Recent studies (West & Russell, 1985; Hughes, Hatsukami & Skoog, 1986) indicate that it is indeed the nicotine which can cause the prolonged use of NCG. Long term NCG users who were abstinent relapsed to smoking when supplied with placebo gum in a double blind study. Effects similar to withdrawal from smoking were reported among long term NCG users trying to end its use. Various studies report the benefits of NCG (Raw, Jarvis, Feyerabend & Russell, 1980; Killen, Maccoby & Taylor, 1984; Hall, Tunstall, Rug et al., 1985; Page, Walters, Schlegel & Best, 1986) but are limited by their designs. When a treatment with NCG is compared to any other treatment without gum, the efficacy of the gum cannot be evaluated. The mere difference in treatment procedure may be responsible for any difference in effect without the researchers being able to discriminate between the effects of procedure difference and NCG. To evaluate the efficacy of the gum properly a double blind randomized design is needed. In this way neither experimenter nor subject are aware of the real character of the gum provided and the treatment conditions can be exactly the same. It is this type of study we aim to review in our article. Several reviews have reported on the pro's and cons of NCG before, yet mainly in a qualitative fashion. An occasional study reports figures yet does so in a global way (Jamrozik et al, 1984; Hughes & Miller, 1984). In this study we report in detail on a meta-analysis of the efficacy of NCG, based on studies with a randomized double blind placebo-control design. Four questions will be addressed in this study: Does application of NCG lead to reliable, significantly better treatment outcomes compared to placebo gum? In order to answer this question in more detail we shall describe the relationship between effects concerning outcome and duration of follow-up. Furthermore an attempt is made to explain effects on success rate by means of some study characteristics. A second issue, more closely related to pharmacological theory, is whether withdrawal symptoms are reduced to a greater extent among subjects using NCG than among those using placebo gum. Is efficacy of NCG reflected by differences in gum use? Whenever NCG differs in alleviating the distress which accompanies smoking cessation this should be reflected by a difference in gum use. Apart from this a relationship between pretreat-

ment cigarette consumption, gum use and success would be expected to emerge. The last question addressed concerns side-effects: is there a difference in the occurrence of side-effects between users of NCG and those of placebo gum?

3.2. Method

3.2.1. Search Schedule

To find the appropriate studies we searched three data bases: The Smoking and Health Bulletin (key word: smoking cessation), the Index Medicus (key word: nicotine) and Psychological Abstracts (key word: smoking), all concerning the period januari 1980-juli 1987. Besides this systematic approach, references of studies concerning smoking cessation in the possession of the authors were searched for nicotine chewing gum publications. This led to a total number of 64 articles, varying from editorials about the use of NCG to double blind placebo studies. Only the latter studies were judged suitable for an adequate evaluation of the pharmacological activity of the gum. This selection resulted in 14 studies. We assume that in this way all published double blind placebo studies reporting on outcome were retrieved and that the results presented in this meta-analysis are representative for the state-of-the-art. The British Thoracic Society study (1983) was not considered comparable to the studies involved in this meta-analysis. We agree to the criticism raised by Jarvis & Russell (1983) that the circumstances of patient recruitment and instructions on use were inadequate to evaluate the gum properly and for that reason did not include it in the analyses. The Axelsson & Brantmark study (1973) could not be retrieved, and may alter the results slightly. The Jarvik & Schneider study (1984) reports on the same trial as Schneider, Jarvik, Forsythe et al. (1983) and is analyzed as belonging to the latter study.

3.2.2. Meta-analysis

The method of meta-analysis constitutes a method for literature review that has several advantages compared to the qualitative survey. Subjective weighing of results by the reviewer is no longer possible without notice. Its use also decreases the risk of misleading interpretations. At the statistical level it becomes possible to explain inconsistent results by the quality of studies, thereby taking into account moderating variables. Various publications provide detailed information on the method of meta-analysis (Glass, McGaw & Smith, 1981; Schmidt &

Jackson, 1982; Strube & Hartmann, 1983; Hedges & Olkin, 1985). In our analysis we standardized the results reported by the original authors, using the effect size as calculated by Glass et al.:

$$ES = \bar{X}e - \bar{X}c/SDc$$

In this formula ES means effect size and $\bar{X}e$ and $\bar{X}c$ are the mean scores on a variable of respectively the experimental group and the control group. SDc is the standard deviation of the control group. If no difference between conditions is found, ES = 0. With large differences ES approaches ∞ or $-\infty$. Whenever the outcome variable in a certain study was presented as a proportion, the latter was interpreted as the proportion of surface under the normal curve. In this way the concommittant Z-values for each proportion were substituted. Effect sizes were then calculated according to the formula ES = Zc-Ze (cf. Glass et al, 1981).

3.2.3. Procedure

Two independent raters classified the results of every study. A third rater compared the classifications and made a final classification in cases which were judged differently. The studies were coded analogous to the system of Glass et al., with adaptations for smoking cessation items. The validity of the studies was measured on a five point-scale. Studies earned one point for each of five possible requirements they met: 1. Mortality at six months follow-up had to be lower than 15 %. 2. Patients were to be assigned at random to the conditions. 3. Therapists also had to be assigned randomly to the conditions. 4. The study had to be double blind. 5. The outcome had to be pharmacologically validated. Studies earning up to two points are considered low in validity, those from two to four as medium. Those studies with five points are considered high in validity.

There are various pitfalls in the calculation of effect sizes. First, studies vary considerably in the number of reported effect sizes, which can lead to biased results when all single effect sizes are averaged. Apart from this, the emphasis of the analyses in one study may be on side-effects, while in another on the effects of nicotine dependence. If we further consider the fact that effect sizes are mutually interdependent within studies, it will be clear that estimates of magnitude of effects are best made at the treatment comparison level (Miller & Berman, 1983). To do so, all effect sizes within a treatment comparison

are averaged before calculating a mean over the treatment comparisons. Yet in our study the calculation of a single overall effect size has been discarded because of the variety of NCG effects that can be observed. According to our purposes we chose to define five main outcome categories i.e. cigarette consumption, withdrawal symptoms, gum use, side effects of gum use, and other effects. Whenever appropriate subcategories have been made. Results are presented weighted for each subcategory because the analyses differ considerably in the number of subjects they are based upon. Results of the maincategories are based on the means of the subcategories. All effect sizes were controlled for the direction of the effect: a positive sign means that an effect is in favour of NCG.

3.3. Results

Table 3.1 summarizes the characteristics of the twelve studies that were analyzed in this meta-analysis. The period of publication extends over 12 years, with the majority of studies being published during the last five years. The validity of the studies can be marked as medium at best.

The variation in treatments reflects the state of the art in smoking cessation research. The majority of studies apply either counseling or broad spectrum treatments. All studies use the 2 mg nicotine gum for the experimental condition, except for two who use 4 mg. In one study a 1 mg nicotine gum was used as placebo. The number of treatment sessions varies between one and eleven and the number of evaluable effect sizes ranges between 3 and 46.

Six studies report on the daily cigarette consumption before treatment, resulting in a mean of 29.7 cigarettes, s.d.= 4.7. Nine studies report on the percentage women, the median here is 56.3 %. The mean age of the participants is 38.8 years, s.d. = 3.8, as reported by seven studies. Most treatments were performed in an individual format. The median number of contact hours is 6.8 hours, taking 4.2 weeks (s.d. = 1.8).

Little information is provided about the number of therapists and their background (see table 3.2). None of the studies reports on the number of years of experience of the therapist, or on the costs of participation for the clients.

Table 3.1. General study characteristics.

Authors	Validity rating	Treatment per cond.	strength of gum in mg.	# of sessions
Brantmark et al., 1973 (1)	low	a. information about benefits	4	1
		b. idem	0	1
Russell et al., 1976	medium	a. support and encouragement to stop smoking	2	n.app.
		b. idem	0	n.app.
Puska et al., 1979 (8)	low	a. health education	4	5
		b. idem	0	5
Malcolm et al., 1980 (5)	medium	a. counseling	2	5
		b. idem	0	5
Fagerstrom, 1982 (*)	medium	a. broad spectrum (occ. with aversion)	2	8*
		b. idem	0	8*
Fee & Stewart, 1982 (2)	low	a. broad spectrum	2	10
		b. idem	0	10
Jarvis et al., 1982 (4)	low	a. counseling	2	6
		b. idem	1	6
Schneider et al., 1983 (6)	medium	a. counseling	2	11
		b. idem	0	11
Idem (7)	low	a. gum dispensary	2	5
		b. idem	0	5
Christen et al., 1984 (0)	low	a. broad spectrum	2	2
		b. idem	0	2
Hjalmarson, 1984 (9)	medium	a. broad spectrum	2	6
		b. idem	0	6
Jamrozik et al., 1984 (3)	medium	a. instructions on gum use	2	1
		b. idem	0	1
Jarvik & Schneider, 1984$	low@	a. counseling	2	11
		b. idem	0	11

Numbers between brackets refer to the data of figure 3.1.
* : mean # of sessions, actual #: 6-15 sessions.
$: reporting on a part of the subjects of Schneider et al., 1983.
@ : when considered as a part of Schneider et al.: medium.

Table 3.2. Treatment characteristics.

characteristic	mean	s.d.	%	n of studies
# of contact hours	5.9*	2.9		4
duration of treatment in weeks	4.2	1.8		9
treatment format				
individual			55	7
group			36	4
otherwise			9	1
# of therapists per condition	1.8	1.0		4
education of therapist				
psychologist			20	1
physician			20	1
other			60	3

*: median = 6.8

The main category consumption shows a benefit for the users of NCG. This group shows higher success rates than users of placebo gum ($p<0.05$). The subcategory "subgroups" was created for subgroup analyses concerning success rate, as these occurred quite often. In this way subgroups of smokers, if any, might be identified for whom NCG has special benefits. Although this category led to a significant effect size ($p<0.001$), the variability in the type of subjects reported on was too large to distinguish any particular subgroup. Craving for cigarettes was not directly reported on and various other little appearing symptoms were categorized under the heading "withdrawal symptoms otherwise". Weight gain, which strictly is not purely a withdrawal symptom was also categorized under "withdrawal symptoms". The magnitudes of effect found in this category are non-significant except for the variable weight: users of NCG gain less weight after treatment ($p<0.001$). Smokers treated with NCG report significantly more often side-effects of gum use than those treated with placebo, particularly General Intestine symptoms ($p<0.05$).

Table 3.3. Means and standard deviations of effect sizes categorized under main- and subheadings.

variable	main category (s.d.) subcategory weigthed (s.d.)	n of effect sizes
consumption	0.32 (0.51)+	12
success rate	.39 (0.32)*	11
success rate (sub group)	.58 (0.18)*	7
consumption otherwise	.39 (1.31)	6
withdrawal symptoms	0.08 (0.25)	6
mental irritation	0.11(0)	1
dizziness	-0.06 (0.13)	2
constipation	-0.05 (0.21)	2
sleeplessness	-0.17 (0)	1
weight	0.39 (0.09)*	2
otherwise	0.17 (0.47)	3
gum use	0.75 (1.05)	7
number of gums used	3.25 (0)	1
otherwise	0.35 (0.23)*	6
side-effects of gum use	-0.24 (0.20)*	6
hiccups	-0.28 (0.85)	4
jaw muscle pain	-0.01 (0.34)	2
(aphtous) ulcer	-0.11 (0.22)	5
general intestine symptoms	-0.47 (0.22)*	4
otherwise	-0.22 (0.18)*	6
Various other effect sizes	0.39 (1.31)	3

main category effect sizes for each study were calculated by averaging the weighted means of sub-category effect sizes.

+: $p<.05$, *: $p<.001$.

3.3.1. Follow-up measurements

We assessed the relationship between time and the effect of the gum on success rates. Regression analysis resulted in a non-significant equation. A scatterplot of the effects is shown in figure 3.1.

A myriad of variables can influence the observed effect sizes. In this study we investigated the effects of validity, number of treatment sessions and type of treatment on the effect sizes with regard to success rates. Using non-linear multivariate analysis CANALS (Van der Burg, 1983) it turned out that 70 % of variance in the mean effect sizes could be explained by a combination of validity, number of sessions and type of treatment.

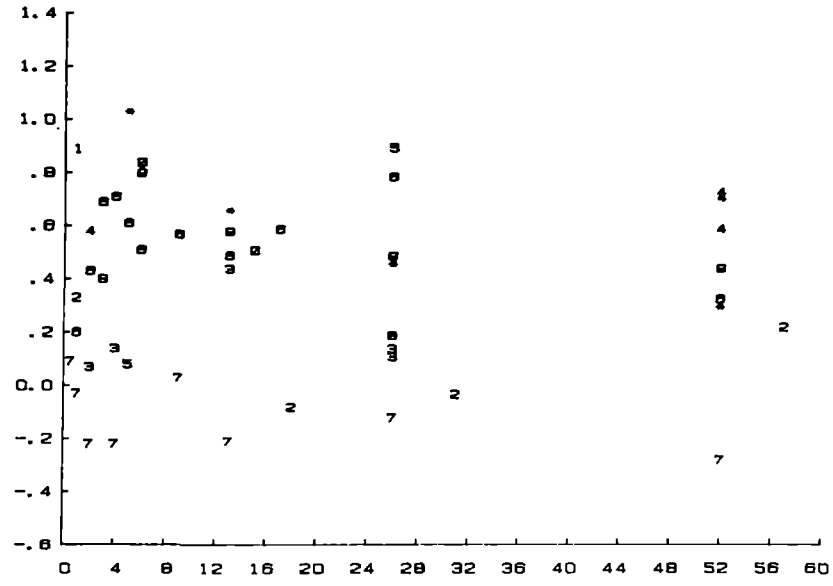

Figure 3.1. Scatterplot of effect sizes concerning success rates by number of weeks lapsed since begin of treatment.
horizontal ax: number of weeks since begin of treatment
vertical ax: magnitude of effect size

3.4. Discussion

A limitation of the studies that were analyzed is that none of them has a balanced placebo-control design. In such a design both positive and negative expectations of the gum's efficacy would be induced. Fagerstrom & Storm (1981) showed that the expectation of nicotine in a placebo gum leads to better results than when a tobacco taste is expected. Similarly, Hughes, Pickens, Spring et al. (1985) found in a self-administration study that the expectation of effect controls the reinforcing properties of NCG. Only recently the role of expectancies about the nicotine gum in smoking cessation has been tested (Gottlieb, Killen, Marlatt & Taylor, 1987). The actual nicotine content of the gum did not influence the cessation rates, expectancy did so to a minor extent. As the design of this study apparently was single blind, experi-

menter bias may have affected the results. Before interpreting the results of this meta-analysis we should acknowledge the interdependence of the effect sizes in the various categories. They may not be isolated or treated as independent figures. Although the effects point in the direction that may be expected based on pharmacological theories, the variability of the effect sizes is very large. The average effect size with regard to success rate for subgroups of smokers however, is highly significant. It turns out that effect sizes categorized under this heading are based on a heterogeneous group of subjects: light smokers, heavy smokers, previously successful quitters, and young, old, male or female smokers. We regard this result as an artefact, caused by the tendency of researchers to report associations in the various subgroups. The significance of the effect size in the consumption category as a whole should be interpreted cautiously because the duration of follow-up varies considerably among studies. Another warning concerns the variability in the used criteria of success: less than 1 gram of tobacco daily, self-report, partial or general validation during follow-up have been compared and used to compute the effect size. The results from figure 3.1 indicate that a large variety exists in the reported effect sizes over time. This should not be a surprise. These figures may simply be too crude to show any close relationship. Correction for treatment duration and number of sessions, gum use and its duration is needed before any valid conclusions can be drawn with regard to the effects of NCG over time. As for the variance in the mean effect size concerning success rate, this can be explained considerably (70 %) by a combination of study characteristics. Note that the number of studies is minimal for an analysis like this, therefore we used non-linear canonical analysis, a technique requiring little assumptions. The canonical weights assigned to the study characteristics are dependent on format and number of the variables involved. During the analyses we varied the format and scale level assumptions which indeed led to considerable differences of the weights assigned. Yet the canonical correlation remained constantly high. However, 70 % may be an overestimation, due to capitalization on chance. For this reason we refrain from providing any data on the canonical weights and conclude that non-pharmacological factors can explain the reported effects of NCG on success rate to a major extent. In accordance with this result deWit & Camic (1987) offer the hypothesis that NCG improves dropout rates. In previous studies attendance at therapy sessions has proven to be a predictor of success (Glasgow, Schafer & O'Neill, 1981; Breteler & Rombouts, 1987). If deWit & Camic

are right any efficacy of NCG as an adjunct to psychological treatment may be based on both pharmacological (nicotine) and psychological (prolonged group support and treatment impact) factors. The studies included in this meta-analysis provided insufficient data on attendance at sessions to test this hypothesis. Regarding the differences in outcome between clinic based cessation and physician aided cessation (Orleans, 1985; Anonymous, 1985) it seems interesting to persue this topic in future studies. For now we have to conclude that with regard to treatment outcome no clear evidence is found in favour of NCG. As for the second question investigated, it appears that NCG does not relieve withdrawal symptoms to a considerable extent. Only a minor number of studies reported withdrawal symptoms systematically, indicating that users of NCG gain less weight than users of placebo. If future studies replicate these findings it may turn out to be a valuable asset of NCG, weight gain being a well known problem in smoking cessation. The information provided by the category gum use is of little practical use. Only one study (Brantmark, Ohlin & Westling, 1973) reported adequately on the number of gums used, resulting in a large effect size. The main shortcoming with respect to gum use data is the lack of presentation of standard deviations. This is a major deficit of the studies reviewed as the efficacy of NCG is supposed to be related to the use of the gum rather than its availability. The category "otherwise" consists of topics like the taste of the gum, its sticking to teeth, the number of users showing a preference for NCG compared to placebo. Users of NCG experience significantly more side-effects of the gum than users of placebo. The effect size concerning General Intestine symptoms is second in magnitude in table 3.3, therefore future developments concerning the gum should be pointed to a decrease of this side-effect. The occurrence of GI symptoms may cause relapse either directly because of their stressful character or indirectly by discontinuation of the use of NCG. However, more information on the relationship with gum use and the role of side-effects in maintenance is necessary. We would like to offer a number of suggestions for further research in this promising area. Future studies should be planned with a double blind balanced placebo design, allowing for the assessment of instruction effects. The attendance at treatment sessions should be recorded more thoroughly. Number of gums used and duration of gum use should be regarded as main variables in order to estimate the efficacy of NCG. Follow-up should extend beyond the use of NCG, in order to assess long term results. More information is needed with

regard to the acceptability of the gum treatment for all smokers who apply for treatment. NCG is possibly the first of a new generation of pharmacologically active adjuncts to smoking cessation. Clinical studies on adjuncts like clonidine (Glassman, Jackson, Walsh et al., 1984) and mecamylamine (Stolerman, 1986) may profit from the suggestions made above. As for NCG we conclude that to date no clearly favorable picture emerges, partly because essential information on relevant variables is missing, partly because of untackled methodological problems in the evaluation of effect.

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Chapter 4. The development and evaluation of a behavior therapy for smoking cessation.

M.H.M. Breteler & R.Rombouts. (1988). Gedrag en Gezondheid, 16, 51-59 (in Dutch). Reprinted by courtesy of Stichting Gawein.

4.1. Introduction

One of the tasks the Dutch Ministry of Welfare, Public Health and Culture has set itself in its policy document "Nota 2000" is to reduce the percentage of smokers among the population of 15 years and over from about 40 % now to 20 % in the year 2000.
This aim corresponds with recent medical insights: smoking is considered to be the principal preventable cause of death (U.S. Surgeon General, 1982). For smoking patients with pulmonary and cardiovascular complaints smoking cessation is even more important than for smokers without complaints, as the vulnerability of their veins and lungs has shown. Several studies (see U.S. Surgeon General 1983, 1984) emphasize the positive effect of smoking cessation for these patients.
In this article we describe the development of a short term behavior therapy for smoking cessation which has been offered to patients with cardiovascular and pulmonary complaints.

4.2. Smoking cessation therapies

During the last fifteen years a great number of survey studies on therapies for smoking cessation have been published (Benfari, Ockene & McIntyre, 1982; Bernstein & McAlister, 1976; Best & Bloch, 1979; Danaher, 1980; Kamark & Lichtenstein, 1985; Leventhal & Cleary, 1980; Lichtenstein, 1982; Lichtenstein & Brown, 1980; Lichtenstein & Danaher, 1976; Schwartz, 1979; Suedfeld & Kristeller, 1982; Thompson, 1978). In the Dutch-speaking regions Breteler (1988); Van Eynatten & Staarman (1983) and Vinck (1980) have published global surveys.
On account of these surveys we come to the following conclusions:

1. No treatment exists which is systematically more effective than others.
2. Broad-spectrum treatments are generally more effective than single method therapies.
3. Relapse is a major problem with all treatments. At the end of a treatment 40-80 % stops successfully. Success rates after one year follow-up fluctuate between 20 and 40 %.

4. Strategies to maintain cessation have not been evaluated suffi ciently.
5. More research is needed into environmental variables that play a role in smoking cessation.
6. Replication of studies that describe effective treatments turned out to be impossible. The results seem to depend on the number of participants and the setting in which a study takes place.
7. Research methodology is a weak point.

Most interventions can be divided into the categories health education, self-regulation techniques and aversive techniques. Besides, some authors pay attention to hypnosis, acupuncture and REST (Restricted Environmental Stimulus Training). With this last technique participants are being socially and sensorically isolated in a dark room for 24 hours at most. Although the results of this technique are comparable to other techniques, there is no sufficient theoretical explanation for this method yet (Suedfeld & Kristeller, 1982). Table 4.1 (overleaf) shows a survey of the most applied behavior therapeutic techniques.
Those techniques that have been applied in the developed therapy will be discussed in more detail further on. Below we consider the motives for not using aversive and nicotine withdrawal techniques.
Aversive techniques are thought unsuitable for application with patients with pulmonary and cardiovascular complaints. The two principal aversive methods burden on the cardiovascular and pulmonary apparatus considerably. In itself this need not be an objection. Lichtenstein & Glasgow (1977) have pointed out that up till now aversive methods have appeared to be quite safe. However, there is no question of wide application. The treatment of patients with this method demands extensive control (Hall, Sachs, Hall & Benowitz, 1984), which handicaps general application.
Nicotine withdrawal techniques still are experimental. Although in particular studies on nicotine chewing gum present positive results with this substance, they are characterized by methodological shortcomings that raise doubt about the pharmcalogical basis of the effects. A study by Foxx & Brown (1979) give indications for the role of expectation and attributional effects in the use of the gum. Research on these factors goes beyond the purposes of the study in which the currently described behavior therapy has been developed.

Table 4.1. List of behavior therapeutic techniques for changing smoking behavior, with theoretical considerations and applications.

Technique	Theory	Application
Aversion	smoking behavior is related to positive stimuli; extinction of this and contingency with aversive stimuli (punishment procedure)	electro shock rapid smoking (smoking every 6 seconds until aversion turns up) saturation (two to three times the daily consumption)
Self-regulation	behavior change in small steps by fixing behavior criterion, self-observation, self-evaluation and self-reward	self-observation stimulus control (reduction of consumption) response substitution self-reward
Relaxation	stress is often mentioned in relapse relaxation is antagonistic response	Jacobson progressive relaxation et al.
Relapse prevention	internal and external factors increase probability of relapse after period of success	booster sessions social support skill training
Nicotine withdrawal	the abrupt stop of nicotine supply leads to withdrawal symptoms and premature failure of cessation attempt	nicotine fading nicotine substitution (lobeline, nicotine chewing gum et al.) nicotine antagonists (mecamylamine)

4.3. Relapse

Relapse is a problem with the treatment of all kinds of addictions. For this reason we will discuss it extensively below. As far as smoking is concerned the techniques to prevent relapse can be divided into booster techniques, social support, skills training and multifactorial techniques (Kamark & Lichtenstein, 1985).

With booster techniques, extra sessions, telephone contacts and texts sent on are meant. These techniques have not appeared to be successful up till now (Elliott & Denney, 1979; Lando, 1981). The role of social support has been given more attention especially during the last few years. Janis & Hofman (in Lichtenstein & Brown, 1983) have introduced the buddy system based on decision theory research. With this each participant is given a partner who supports in persevering in the decision of behavior change. Mermelstein, Cohen, Lichtenstein et al. (1986) also came across slight indications for the role of social support in maintaining non-smoking. In their study success was related to the reported social support. Lichtenstein, Glasgow & Abram (1986) also reported this relation. However, they did not find any difference in success between treatments without and treatments with a social support component. Consequently the role of the social environment in relapse deserves further research.

Skills training (see Killen, Maccoby & Taylor, 1984) implies that the participants learn strategies with which they can tackle difficult situations with regard to smoking. With this approach too the results are not unambiguous (Lichtenstein et al., 1986).

A well-known multifactorial technique has been developed by Marlatt & Gordon (1980). These authors suppose the Abstinence Violation Effect, to be indicated from now on as AVE. If an ex-smoker lights a cigarette in a crisis situation, negative emotions such as guilt, attributions and cognitive dissonance would lead to renewed regular smoking. Recent research into the AVE (Curry, Marlatt & Gordon, 1987) has shown that for participants who had smoked again after treatment there appears to exist a negative relationship between the duration of renewed abstinence and the AVE. In preparing participants for these processes an attempt is made to prevent total relapse.

Increasing the efficacy of relapse prevention techniques is the greatest challenge for present research into smoking cessation. For a more complete survey of methods of smoking cessation we refer to Schwartz (1987).

Only seldom realization of treatments for smoking cessation is reported on. In most articles a more or less global program of treatment is presented. In this article we try to give an insight into the steps that have led to the behavior therapeutic program which has been compared in a quasi-experimental design to a control condition (non-specific counseling). The results of that comparison have been published elsewhere (Breteler & Rombouts, 1987); its discussion goes beyond the scope of this article.

4.4. The development of a short term behavior therapeutic program for smoking cessation.

The program has been developed with three groups of smokers, viz. banking staff, hospital staff and patients with pulmonary and cardiovascular complaints (see table 4.2). The characteristics of these groups, the procedure and the results will be discussed in a later stage, below we describe the applied interventions. During the development the treatment has remained unchanged with regard to a number of elements. For example every version consists of five sessions of one and a half hour. This agrees with the current clinical practice (Thompson, 1978). The sessions are led by two therapists. The clients take home written material on the themes dealt with (bibliotherapy) and they are supposed to carry out tasks at home. The contents of the texts as well as the homework have changed together with the nature of the interventions. From the second pilot version onwards participants take home a scheme which is extended gradually (figure 4.1). All follow-up sessions are focused on the experiences of the participants. Problems with non-smoking are discussed in terms of finding solutions to solve them. Successful quitters are used as a model and describe their successful strategies of non-smoking. See table 4.2 (overleaf) for a schematic survey of the various versions.

4.4.1. The first pilot version.

The core of the first pilot version of the therapy consists of a gradual reduction of the number of cigarettes smoked. In the first session the goal of self-observation is explained and the filling in of the corresponding forms is trained. After the second session participants smoke two to six cigarettes a day less than in the week of self-observation. After the third session they smoke only half the amount of the first week. Besides, the buddy system is introduced in the second week. In the third session attention is paid to relaxation exercises and thinking

of smoking. Participants learn to say "stop" powerfully to themselves when they think about smoking in order to think of something else. After the fourth session they stop smoking. The interventions which are used with this are self-observation, stimulus control, response substitution and self-reward. The covert sensitization method (Cautela, 1979) is also explained.

Table 4.2. Scheme of behavior therapy program according to three versions*.

session		pilot version I banking staff (n=46)	pilot version II hospital staff (n=22)	exp. version patients (n=57)
information		–	–	introduction study informed consent
	1	introduction contract self-observation	introduction contract self-observation decision list possibly cessation	introduction contract self-observation
	2	cutting down self-regulation buddy system	cessation self-regulation covert sensitiz.	cessation self-regulation
	3	cutting down relaxation thought technique	relaxation buddy system	relaxation buddy system
	4	cessation covert sensitiz.	thought technique	thought technique
	5	relapse training	relapse training exposure exercise	relapse training exposure exercise
follow-up		discussion results intention	discussion results intention	discussion results intention

* After every session participants take home written material that concerns the themes discussed (bibliotherapy).

Through this participants can relate in thought smoking to aversive stimuli. The fifth session is characterized by an exposure exercise. Cigarettes are distributed and lighted (not by the participants). The importance of coping effectively with this kind of stimuli in other situations is emphasized and the flooding principle is explained to the participants. In the supplied texts the interventions are explained once more and the homework of the corresponding week is mentioned. Moreover relevant information is offered on the health effects of smoking and withdrawal symptoms. The views of the participants on gradual reduction in the first version were divided. The period of reduction was found too short or too long. Most of the participants criticized this technique. The effect of the relaxation exercises and the thought technique remained unclear. A disadvantage was that both were explained in one session. As a consequence of this the impact of both interventions probably remained too superficial. Besides covert sensitization was not applied. In the follow-up meeting it appeared that many stimuli still gave cause to thoughts of smoking.
On the basis of this evaluation and literature data (Flaxman, 1978; Lichtenstein, 1982) it was decided to place the moment of cessation at an earlier stage in the treatment and to have participants quit "cold turkey", i.e. without prior reduction. The relaxation exercises and the thought technique would be discussed in two separate sessions.

4.4.2. The second pilot version

In this version there is no gradual reduction of smoking any more. The participants quit in one term. This moment is placed at an earlier moment in the therapy to prevent participants from simply being "thrown into the deep", as one participant mentioned it. On account of the good experience with the self-observations and the realization that resulted from this, the first session has been extended with a decision list. In this list there are questions on antecedents and consequents of smoking, motivation to stop and expectations concerning that. The therapists suggest that if a person has an insight into the aspects of smoking behavior as asked in that list, he would be able to quit smoking immediately. Without this insight he might pay attention to this in the following week. In the second session this list is discussed again. The results of cessation or self-observation and the alternatives for smoking (response substitution) are discussed. For those who still smoke, a cessation date is fixed at least one day before the next session. During the third session the emphasis is on relaxation exer-

cises. The buddy system is also introduced now. The fourth session is dedicated to thinking of smoking. After the discussion of the relaxation exercises the role of thoughts in smoking cessation is illustrated by means of a "poster exercise". This exercise shows that thoughts of smoking can be evoked by stimuli. On a poster there are all kinds of situations represented. For two minutes the participants look at the poster and write down what they have seen. Some situations will have recalled thoughts of smoking. If those thoughts are positive, the extent to which such situations occur in daily life is discussed. In this way thoughts of smoking are no longer an inexplicable phenomenon. Next two techniques are trained: thought stop and the challenge of thoughts on smoking (see Diekstra, 1976). In the homework covert sensitisation has been included as a third alternative. In essence the fifth session has remained the same as in the first version. The exposure exercise has been added as smoking in crisis situations is often an avoidance response. By deliberately seeking difficult situations and not smoking in crises self-efficacy expectancy is hightened and strong stimuli for smoking are extinguished. Finally the effect of this method is discussed in the follow-up session in which the course of smoking cessation is evaluated. In practice, the possibility to choose between immediate cessation or cessation after one week was a disturbing element. Two kinds of participants developed whose problems were less interesting to one another. On account of the above it was decided not to maintain the use of the decision list. Trough advancing the quitting moment the problems of non-smoking were brought out more clearly than in the first version. As an intervention quitting in one term appeared to be equally successful as cutting down: some participants accomplished this task, some did not. The separation of the themes relaxation and thoughts offered advantages in that it was possible to go deeper into these aspects of smoking cessation. A disadvantage was that in practice both aspects occur at the same time naturally. Accordingly the situation arose during the evaluation that some participants preferred another order of the themes. Indeed the participants became aware of the fact that thinking of smoking is often related to situations, but this does not offer a solution for preventing these thoughts. Therefore it was decided not to maintain the poster exercise but to introduce an imagination exercise in the following version. In the homework text a simple schedule of processes occurring in smoking cessation was extended in correspondence with the themes treated in the sessions (see figure 4.1).

4.4.3. The experimental version

On the basis of the foregoing the experimental version that has been presented to the patients finally has been developed. The use of the decision list has been dropped and all participants quit after the first meeting. From the second meeting the decision list has been removed. The third meeting is identical to the one in the previous version apart from the removal of covert sensitisation. For this exercise too little time was left yet. Besides this exercise meant an increase of the complexity of the therapy, whereas the literature reports dissappointing results (Lichtenstein & Danaher, 1976). For the demonstration of the importance of thoughts with quitting we have chosen an imagination task this time. With this stronger emotions came forward than with the poster exercise which enhances this intervention.

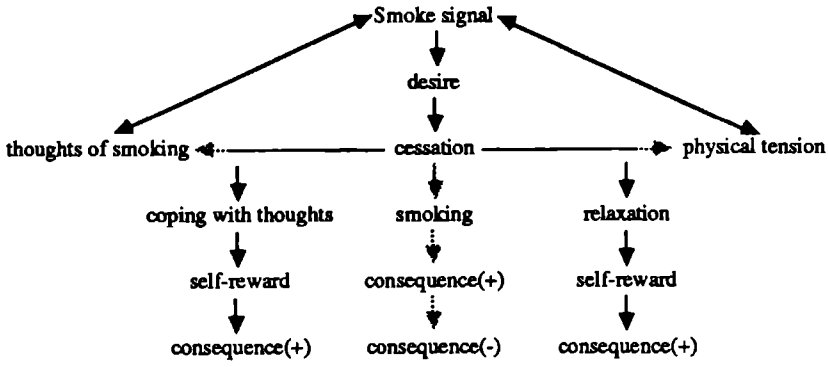

Figure 4.1. Scheme of processes in smoking cessation.

The participants are instructed to think of a pleasant situation, then of an unpleasant one, followed again by a pleasant one. Afterwards the differences between the corresponding emotions are discussed and emphasis is placed on the fact that we can actively evoke and end thoughts and emotions; this is important with thinking of and having a craving for a cigarette. The fifth session is identical to the preceeding one.

4.5. Evaluation

4.5.1. Recruitment

The recruitment took place in three different ways. With the first pilot version on inquiry on smoking, health and attitude to life was sent to the banking staff (n=2357) by business post. On the back flap of this inquiry there was an invitation with an outline of the course that would partly take place during working hours and partly during lunch time. Interested smokers could send a card with "yes, I want to quit smoking" to the Health Department.

The second pilot version was tested with a hospital staff. The staff (n= circa 3000) was offered participation via the staff magazine and announcement on the tables in the staff restaurant. Here as well the course partly took place during working hours. Interested people could enlist themselves by note or by telephone. The experimental version was meant for patients of the University Hospital Utrecht who could reach the hospital within half an hour. They (n=3011) received a letter at home from the professor of the department that treated them. In this letter which contained a reply card, participation was heartily recommended.

4.5.2. Participants

Participation in the program was free with all three studies.

With the banking staff 54 smokers responded by sending the application card. In the end 46 of them participated, divided over five groups of 7 to 11 participants. With the hospital staff 52 participants who wanted to quit smoking responded. At the first meeting 29 participants appeared. Seven of them cancelled participation on account of irregular working hours, or other goals than smoking cessation (reduction). So 22 smokers remained in groups of 7, 7 and 8 participants.

At first 170 smokers responded to the letter to the patients (experimental version). They were divided at random into two treatment conditions: Behavior therapy and non-specific counseling. At a number of information meetings 150 smokers turned up, of which 104 took part in a study into the effectiveness of the two treatment conditions. 57 Patients participated in the behavior therapy condition (see Breteler & Rombouts 1987) in groups of 9 to 14 participants. The meetings took place in the afternoon as well as in the evening, in different rooms of the hospital.

4.5.3. Therapists

In study I the therapists were one behavior therapist, two junior behavior therapists and one social worker. In study II the therapists were one behavior therapist and one junior behavior therapist. In study III the treatment was performed by four junior behavior therapists. This study was supervised by a behavior therapist.

4.5.4. Instruments of measurement

All participants had to fill in questionnaires for participation in the program. With the banking staff this was an internal company inquiry into smoking (Breteler & Rombouts, 1986). Cigarette consumption before the treatment was measured with categories. Later on these were transformed into a semi-continuous variable, based on the category-averages.

In study I motivation for behavior change has been measured with statements on a six point scale, in other studies with a nine point scale. Motivation is represented by a number. The lowest motivation is expressed by the statement " I want to keep smoking as I am doing now" (in study I: "I want to decrease my smoking", the highest motivation by " I want to quit smoking directly". Nicotine dependency was measured by means of Fagerstrom's (1978) Tolerance Questionnaire (TQ). This questionnaire consists of 8 questions on the smoking pattern and can be considered as an indicator of nicotine dependence. The values on this questionnaire can range from 0 to 11.

Stimuli to cessation have been measured by six questions. Participants could indicate if they were stimulated to smoking cessation by their partner, family, collegues, friends, general practitioner, anti-smoking advertising and physical complaints.The scores on this variable can vary from 0 to 6. In study II and III attendance at the sessions has been kept up systematically. The attendance in study I has been estimated with the aid of the data that had been kept up by the therapists. This variable can range from 1 to 5.

In study II and III the frequency with which nine interventions were applied, has been asked for. Measurement took place on a four point scale: seldom or never, sometimes, often, very often or always.

4.5.5. Outcome criteria

In study I the participants had indicated orally how many cigarettes they had smoked in the past week. With the follow-up in study II and III the participants filled in questionnaires with regard to the amount

of cigarettes, cigars and pipes they had smoked in the preceeding week. They could return these lists in a prestamped enveloppe. If a list was not returned, telephone contact was made up to three times, after that the data were considered to be unknown. Measurements took place at the end of the treatment, and at 52 weeks at most after the end of treatment.

4.6. Results

4.6.1. Study I

Taking the results of the inquiry with the banking staff (Breteler & Rombouts, 1985) as a reference, 4.4 % of the addressed smokers participated (n=46). The participants are mainly men (70 %; n=32). Mean age is 36.2 years (s.d.=9.0) Before treatment the participants smoked on the average 18.3 cigarettes daily (s.d.=8.1); the mean TQ score is 5.0 (s.d.=2.0). The mean score on the motivation instrument is 3.9 (s.d.=1.8), the participants are present 3.7 sessions.
Success percentages with the banking staff are at the end of treatment 24 %, at four weeks after end of treatment 20 % and at 13 weeks after end of treatment 17 %.

4.6.2. Study II

Study II concerns a small group (n=22), which means an estimated participation of 2 % of the smokers (based on National Foundation on Smoking and Health, 1987). The divsion between men and women (45 % women, n=10) is balanced, with a mean age of 36.8 years (s.d.=10.8). Both cigarette consumption (mean 22.7, s.d.=9.6) and TQ score (mean 5.6, s.d.=2.3) are higher than with the banking staff. The motivation score has a mean of 6.7 (s.d.=1.8) and the participants are present at 4.4 sessions on the average (s.d.=0.7). The participants experience incitements to quit smoking from one to two sources (mean 1.8, s.d.=0.9). In this study 59 % was successful at the end of treatment. The success percentages at follow-up after 4 and 52 weeks are 36 viz. 23 %.
Data on the application of the used intervention strategies are known of 19 participants. Self-observation was applied most (mean score 2.8, s.d.=1.0), followed by relaxation exercises, response substitution, thought stop, challenging thoughts, self-reward, telephoning fellow participants and reading information. "Being telephoned" is indicated to have happened least (mean 1.5, s.d.=0.5).

4.6.3. Study III

Participation in this study amounts about 7.3 % (Breteler, Rombouts & Mertens, 1987), which means 57 participants for the behavior therapy condition. The participants mainly are men (63 %; n=36). Mean age of the participants is 53.9 years of age (s.d.=11.4), they smoke a mean of 23.5 cigarettes daily (s.d.=11.4) and have a mean TQ score of 5.9 (s.d.=1.6). The average score on motivation is 6.9 (s.d.=1.6), the number of sessions present is 3.7 (s.d.=1.4) and the mean number of sources of incitement to stop smoking mentioned is 1.5 (s.d.=1.3).

The survival curve for the participants of the behavior therapy condition is as follows: 32, 21, 18, 16 and 16 %, measured at the end of treatment and 4, 13, 26, and 52 weeks later.

In this study response substitution was applied most (mean score 2.7, s.d.=0.8). Also in this study "being phoned"was given the lowest score : 1.4 (s.d.=0.7). In between lie, in descending order of application: relaxation exercises, thought stop, self-observation, challenging thoughts, reading information, self-reward and the telephoning of fellow participants.

4.7. Discussion

The participation percentages indicate that data of smoking cessation therapies may only be generalized with caution to smokers in general: the majority of the approached smokers do not participate in the offered treatment. This fact remains unmentioned in many studies, possibly due to lack of knowledge about the impact of the recruitment (see McFall, 1978 for a discussion on this subject).

The first two studies have been made with groups of healthy persons. These groups are also younger than the participants in study III. Besides, the effort they had to make in order to take part was smaller than that of the patients who sometimes needed half an hour to reach the course. The two pilot versions were performed in part during working hours. So participants hardly had to travel and were partly exempt of work. Furthermore we need to consider that study I concerns a treatment in which participants decrease their smoking gradually, whereas in the other two studies the participants quitted abruptly. It should be clear then, that the results cannot be compared sensibly and may only be regarded as an indication of the efficacy of a certain version with a particular group of participants.

The participants were stimulated little to quit smoking: in this the patients do not differ from the two other groups. This result is con-

siderable with a view to the importance of smoking cessation for patients. Further research may prove if this concerns a low intensity or low frequency of stimulations, or that the smoker him- or herself neglects stimulations. A previous publication (Breteler & Rombouts, 1987) shows that short term behavior therapy (13 weeks after the end of treatment) is as successful as non-specific counseling without interventions aimed at smoking (18 % vs. 10 % success, n.s.). From this we conclude that the specific effects of the applied behavior therapy, so far as present, are of less importance than non-specific effects, such as the setting, motivation and treatment structure (McFall & Hammen, 1971; Hall et al., 1984). This is supported by the fact that in study III motivation appeared to contribute in the explanation of smoking status at 52 weeks follow-up (Breteler, Rombouts, Mertens & van der Staak, submitted). The motivation of the participants of the banking staff can be described as "I want to stop smoking this year"; in both other studies as "I want to stop smoking within three months".

Because of missing data a reliable prediction of the result on the basis of the applied intervention strategies is impossible. Self-observation, response substitution and relaxation exercises are the strategies most applied. These have been applied "sometimes" to "often". The buddy system has been introduced to prevent relapse. It seems that this system has not functioned at all in the last two studies. People hardly phoned each other. In the first study it did function. The different nature of this study in which several people of a department sometimes participated, may play a part in this. If we have a look at other low scoring strategies, these appear to be the ones that do not occur as a main theme in a session. The relatively short time devoted to the introduction of these strategies can be a likely explanation of this result. The average of reading information is "sometimes". This result emphasizes the importance of the sessions, written material is not used completely.

In a longer term the results fluctuate again round 20 %. Relapse remains a problem that has not been prevented essentially with the techniques such as applied in this therapy. Curry et al. (1987) find a correlation $r = 0.55$ between attributions on a global/specific dimension, measured before a relapse to smoking and after it. A global attribution style points at overgeneralization, a style of thinking that can be changed by RET techniques. In what way such a relapse prevention can contribute to more effective dealing with risk situations ought to be explored further. This train of thought fits in with the "life style

balancing" as presented by Marlatt & Gordon (1985). In the last study relapse did imply a considerable cut down of cigarette consumption.
It strikes us that from the very beginning relatively few participants quit smoking. The use of a nicotine fading procedure (Foxx & Brown, 1979) in which the percentage of nicotine of the smoked cigarettes (but not the number of cigarettes) is reduced gradually, might be introduced in a further development to achieve a greater number of quitters. This would also imply prolongation of the therapy. A second change might be that the interventions are executed concerning the stage of behavior change in which the clients find themselves. In this case standardization of the program is limited to that aspect; the duration and the number of meetings can vary per client then. We conclude that with the experimental version we have developed a behavior therapy program that during a short period of time deals adequately with a number of essential elements of smoking cessation. The sessions link up well with each other and throughout the therapy a schematic representation of smoking cessation is further elaborated on. Of course this does not mean that there are no more improvements possible as already has appeared from some considerations in the discussion. Moreover whether change with regard to the existing therapy will lead to an improvement of the result, will have to be investigated in a quasi-experimental design.

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5.1. Introduction

The results of smoking cessation programs have remained modest in the course of several decades (Hunt & Bespalec, 1974; Best & Bloch, 1979; Leventhal & Cleary, 1980; Lichtenstein, 1982). Well controlled studies (e.g. Rabkin et al., 1984) show none or small, long term differences in outcome of various programs. Leventhal & Cleary (1980) put it this way: "It is simply better to do something than nothing" (p. 374).

A variety of approaches to outcome evaluation has been used to analyze and ameliorate the results.

The classical approach uses a quasi-experimental design in which outcome of an experimental condition is compared to that of a control or placebo condition. The contemporary boom of studies investigating the use of nicotine gum represents this approach. Although nicotine gum adds to the short term results of psychological treatment, its effect fades over time (Jarvis et al, 1982; Schneider et al., 1984).

From a different point of view client characteristics are analyzed in relation to success. Pomerleau et al. (1983) report that participants who were less likely to have relapsed at one year follow-up were those who, prior to treatment, smoked less while in a negative mood. Using this approach, cessation programs can be tailored to the clients through appropriate screening.

Some authors explicitly investigate the role of therapy variables. Hughes et al. (1985) show that the ability of nicotine gum to serve as a reinforcer is controlled by the instructions provided. Lando (1980) stresses the role of therapist-client interactions. Participants in an intensive contact condition were more successful at 12 months follow-up than those in a minimal contact condition. Hajek et al. (1986) studied 28 cessation groups over the course of two years. They report that a group-oriented treatment was more successful than therapist-oriented treatment.

Again another stance is represented by Lichtenstein (1982). According to this author we should not look for high outcome rates, but rather for essential process variables. A preliminary process model has been

developed by DiClemente & Prochaska (1982). This model postulates three stages of change: decision to change, active change and maintenance. The explanatory power of this model has yet to be shown.
Shiffman (1982) points to the importance of environmental variables for maintenance. His findings show that most ex-smokers relapse in the company of others.
The studies mentioned above illustrate the main approaches in psychological smoking cessation research: study of therapy impact, client characteristics, client-therapist interactions, and change process- and environmental variables. The question addressed by these approaches can be put in a very condensed statement as "What is the crux?".
The purpose of the present article is to elaborate on this question further with regard to the outcome of smoking cessation programs. As the described study made part of a larger study among patients, the role of bodily complaints is evaluated in more detail than in studies concerning healthy subjects. We shall compare two programs: a non-aversive behavior modification program and a non-specific, group-oriented counseling program.

5.2. Method

5.2.1. Subjects

Subjects were out-patients treated for cardiovascular and pulmonary complaints and their partners[1]. Initially 170 smokers applied for participation, 120 men and 50 women. Mean age was 52.0, s.d 12.6. Five people did not show up in the Behavior Modification (BM) condition, 15 in the Non-specific Counseling (NC) condition. Note that none of these people were aware of their assignments. After the information session 16 people in the BM condition did not return and 30 in the NC condition. Of the people who started treatment 60 participated in the BM condition, and 44 in the NC condition. Data of 99 subjects were analyzed. Data of three participants in the BM condition and two in the NC condition were excluded from data analysis. These participants had stopped smoking on their own before the start of the programs.

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[1] In the original publication the partners were erroneously reported on as patients. See chapter 6, section 6.2.1. for a more detailed description of the subjects involved in the evaluation.

5.2.2. Design

The subjects were assigned randomly to the conditions, within time constraints. To prevent waitinglists, some subjects were occasionally added to a starting program condition. Before treatment, subjects filled in a questionnaire about socio-demographical medical, smoking and cessation variables. At the end of treatment all participants filled in an evaluation questionnaire about the quality of treatment received. BM participants also answered an evaluation questionnaire with regard to behavior modification interventions. At the end of treatment and during follow-up participants filled in f-u questionnaires about smoking behavior, withdrawal symptoms, self-efficacy and beliefs.

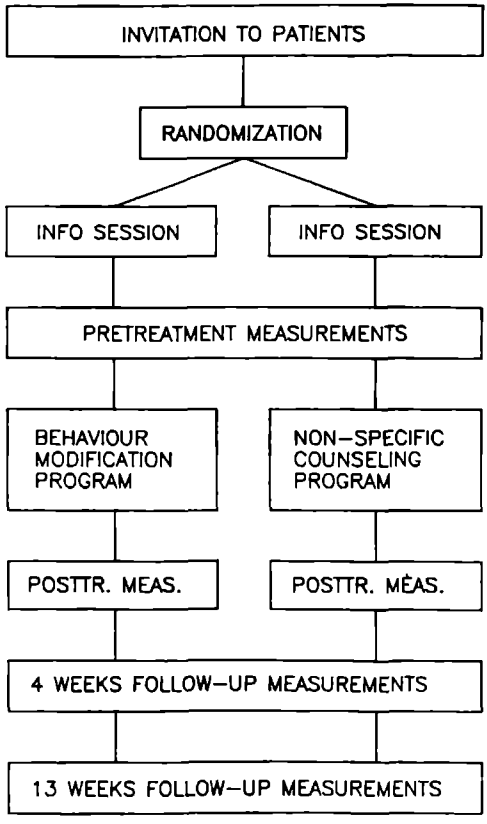

Figure 5.1. Design of the study till 13 weeks follow-up

5.2.3. Treatment programs

The two programs were identical in number and duration of sessions. They consisted of five weekly sessions, each session taking one and a half hour.

5.2.3.1. The Behavior Modification (BM) condition

In the information session the treatment program and the research project were introduced to the participants. The patients signed an informed consent.

In the first session participants were introduced to each other. They signed a contract for a cessation date in the next week and were instructed to observe their smoking behavior in the upcoming week.

In the second session the success in cessation and the self observations were discussed. The main themes of this session were respons substitution and smoking cue management. Examples of respons substitution given were eating an apple or chewing gum. Cue management topics were removal of smoking cues and reordering of daily rituals.

The third session was dedicated to relaxation exercises as an antagonistic respons to stress in general and stress caused by the cessation of smoking.

The fourth session focused on thought stopping, that is: how to divert the attention away from hindering thoughts. The influence of thought on emotion was illustrated by guided imagery. Participants were instructed to think of a pleasant event, to be followed by thoughts about an unpleasant event, which were followed again by thoughts about a pleasant event. Differences in emotions and their consequences for smoking cessation were discussed afterwards.

The theme of the last session was how to deal with long lasting difficult situations. Participants were instructed to enter a difficult situation and to stay in it until the situation no longer caused distress. This use of flooding in vivo means an addition to the general repertoire of behavior modification techniques applied in the field of smoking cessation.

5.2.3.2. The Non-specific Counseling (NC) condition

This program started in the same way as the BM program. Participants were introduced to each other and signed cessation contracts. At the start of every session the patients discussed the experiences they had during the last week. In the NC condition the therapists focused on group cohesion. Participants were reinforced for adequate listening

behavior, mutual support, cessation-directed statements and emotional expression. Therapists stated the importance of these behaviors and stimulated their use. Participants were confronted with non-cohesive behavior whenever applicable.

5.2.4. Measurements

Cessation motivation is operationalized by nine statements varying in degree of intended behavior change. Participants had to fill in which statements applied to them. Each statement was given a number, each subjects' motivation is represented by their number. Lowest motivation is represented by the statement "I want to smoke the way I do" , highest motivation by "I want to stop smoking immediately".

The pretreatment consumption is represented by the estimated daily consumption.

Nicotine dependence is measured by a Dutch translation of the Tolerance Questionnaire (Fagerstrom, 1981), which indirectly measures the tolerance of the body for nicotine. Cronbach's alpha of the Dutch version of this questionnaire is 0.53.

We also assessed the experienced social pressure to stop smoking, exerted by partner, family, friends, colleagues, physician and commercials. The participants ticked the items referring to persons who had stimulated them to stop smoking. Social pressure was operationalized as the sum of these items.

Beliefs on smoking and not smoking were also measured, using a 24 item four point scale. This scale contains positively and negatively tuned items on both smoking and not smoking, such as "Not smoking causes overweight" and "Smoking gives self-confidence". Scoring categories are "disagree very much", "disagree", "agree", "agree very much". These categories were used in order to force subjects to express their beliefs. Cronbach's alpha for beliefs about smoking is 0.57, for beliefs about not-smoking 0.50.

Outcome at follow-up is defined as the smoking behavior during the week before completion of the f-u questionnaire. Those reporting smoking even one cigarette are considered smokers. Those participants who failed to return the f-u questionnaire are classified as missing.

5.3. Results

The group consists of 99 subjects, 69 men and 30 women. Pretreatment characteristics for both conditions are shown in table 5.1. No diffe-

rences in pretreatment variables were found to be significant. The randomization has been successful.

Table 5.1. Pretreatment characteristics of participants.

variable	BM		NC		
	mean	s.d.	mean	s.d.	n
age	53.9	11.4	51.0	12.0	89
educational level	3.0	2.2	3.0	2.0	85
number of cigarettes daily smoked	23.5	10.6	20.3	9.0	77
number of cigars daily smoked	12.8	4.6	11.4	5.1	24
motivation	6.9	1.6	6.7	1.8	74
social pressure	1.5	1.3	1.6	1.2	99
nicotine tolerance	5.9	1.6	5.2	2.0	62
beliefs about smoking	-1.3	5.5	-2.7	5.0	62
beliefs about not smoking	4.0	4.5	5.4	4.7	63

5.3.1. Outcome

Program outcome did not differ between conditions. At the end of treatment success was highest: 31.6 % for the BM condition and 40.5 % for the NC condition (chi square = 1.56 (2), n.s.). At four weeks follow-up the success rate dropped to 22.8, resp. 28.6 % (chi square = 0.43 (2), n.s.). At thirteen weeks follow-up these rates were 17.5 and 9.5 % (chi square = 1.40 (2), n.s.).

Missing data rates show an opposite curve, it starts at 22.8 % and mounts to 26.3, resp. 40.4 % for the BM condition. Similar percentages for the NC condition are 26.2, 23.8 and 47.6 %. Differences between the conditions were not significant. Smokers of low tar, low nicotine cigarettes ($n = 19$) appeared to be more successful than others at end of treatment (chi square = 8.1 (2), $p < 0.05$) and at four weeks follow-up (chi square = 8.3 (2), $p < 0.05$). At thirteen weeks follow-up this difference had disappeared (chi square = 0.9 (2), n.s.).

At four weeks follow-up participants treated for joint complaints were more successful than others. Those most hindered by their complaints turned out to be often smoking at thirteen weeks follow-up or to provide missing data (chi square = 11.5 (2), $p < 0.01$). Also those who often

stop their daily activities because of their complaints were little successfull at thirteen weeks follow-up: chi square = 9.2 (2), $p < 0.01$.

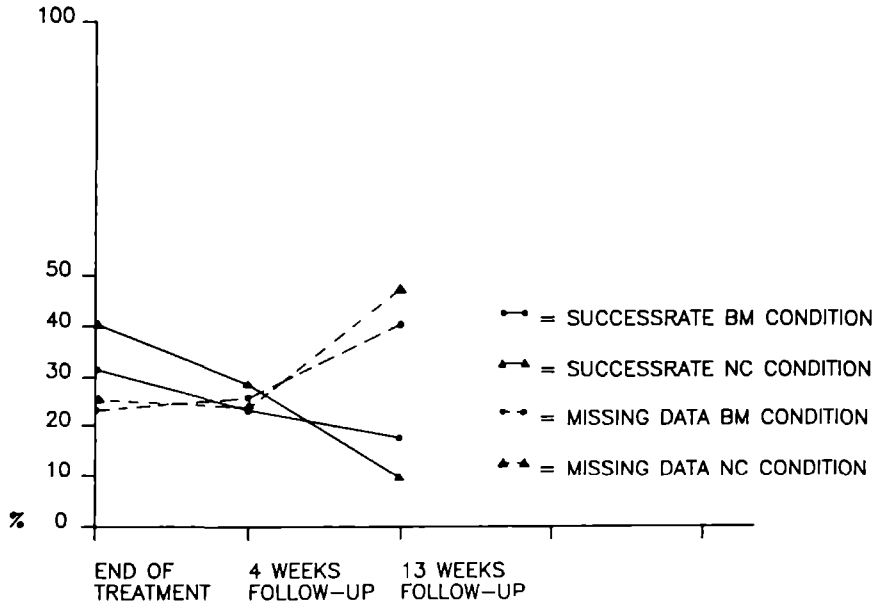

Figure 5.2. Results of BM and NC conditions at end of treatment, 4 and 13 weeks follow-up (n = 99).

5.3.2. Relationship of process variables to outcome

Attendance rate for both conditions did not differ significantly: the combined percentages of participants present at 1, 2, 3, 4, or 5 sessions are respectively 12, 13, 12, 24, and 38.

Attendance at the sessions explains results at end of treatment (chi square = 38.6 (2), $p < 0.001$) and at four weeks follow-up (chi square = 26.9 (8), $p < 0.001$). Those more present were more successful; most missing data occurred among those present at maximally three sessions. At thirteen weeks follow-up the differences were no longer significant.

Relationships of pretreatment variables with attendance have been investigated. Participants who attended well are those treated for cardiac complaints (Spearman's rho = 0.29, $p < 0.001$). Also patients with

little breathlessness (rho = -.28, $p < 0.001$) and those who are little hospitalized for Chronic Obstructive Lung Disease (COLD) attended well (rho = -.33, $p < 0.001$).

5.4. Discussion

This study replicates the puzzling contrast found in previous studies: different programs do not lead to significant differences in outcome. Yet some identities could not be avoided in our design. Both programs are identical in the number and duration of sessions. Therapists worked in both conditions. The relevance of these identities cannot be evaluated in this study.

Pretreatment smoking variables such as motivation and dependence do not explain results. Whether one doubts to stop smoking or wants to stop smoking immediately, whether one is high or low dependent, bears no relationship to the outcome of the programs.

The results of this study are in acccordance with those of McFall & Hammen (1971) who partially attribute results of smoking programs to non-specific variables. Further investigation of these variables may well prove to be of importance for maintenance. Although we did assess social pressure to stop smoking before treatment we did not measure social pressure to maintain cessation or to resume smoking again. Shiffman (1982) found that relapse often takes place in the company of other people. This may be an indication of the importance of social pressure after treatment. Scrutinous assessment of the environment after cessation can uncover a new field for interventions.

The most striking result concerns the relationship of outcome to complaints. One would expect patients who are highly troubled by their complaints to be most successful, as they are the ones who benefit most in terms of health. Yet those hindered most do not maintain their cessation. It may very well be possible that the programs have not offered the participants sufficient alternatives to cope with their bodily complaints. Behavior strategies useful in coping with smoking cessation may not be able to cope with complaints the way smoking did. The design of our study does not allow further investigation of this hypothesis.

Apparently the explaining power of attendance is restricted to short term outcome. As patients with considerable breathlessness and those previously hospitalized for COLD attend relatively little we must conclude that an important subgroup of the participants has not used the program optimally.

Smoking cessation may turn out to be a secondary treatment goal. Cessation can deprive smokers of an important coping strategy (Collins & Marlatt, 1983). This may prevent successful maintenance when insufficient flexibility in coping with bodily complaints is present. From a behavior modification point of view the problems to be coped with need attention, in which case a conventional cessation program may not be appropriate. As smoking cessation studies often exclude participants with health related complaints little attention has been paid to this issue. Assessment of the strategies used to cope with bodily complaints is necesary for a further investigation of this hypothesis.

This study covers only a small area of the fascinating but difficult field of smoking cessation research. It has some methodological limitations: the results are rather short term and pharmacological validation of the results is still to come. Yet as for one aspect it is undeniably clear. Extending our knowledge about the so-called non-specific variables can contribute to a more powerful theory of smoking cessation.

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Chapter 6: Smoking cessation in out-patients: outcome and prediction of smoking status

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6.1. Introduction

In several hundreds of studies the effects of smoking cessation therapies have been evaluated. There appears to be no single outstanding type of smoking cessation therapy, which over and again proves its effectiveness (Benfari, Ockene & McIntyre, 1982; Schwartz, 1987). However, multi-component treatments are in general more successful than a single intervention strategy. The by far shortest way to summarize these findings may be a remark of Leventhal and Cleary in their 1980 review: "It is simply better to do something than nothing" (Leventhal & Cleary, 1980). The similarity in results may partly be caused by participant characteristics. Results mostly concern groups of selected, highly motivated participants, often with exclusion of smokers with physical complaints. This selection constitutes a threshold that may prevent differences between methods to appear. When a smoker has to pass a screening, when he has to pay money, and has to wait for six weeks and then still wants to participate, the specific effects of any treatment may turn out to be minimal. This leaves open the possibility that treatment differences do show up when no such selection criteria are used. Treatment characteristics may show their specific effects among smokers with bodily complaints who otherwise would not have participated. Two questions concerning effectiveness of a smoking cessation program are addressed in this report on an intervention study.

In the first place, two treatment conditions are compared with regard to outcome: a Behavior Modification condition (BM) and a Non-specific Counseling condition (NC). The study is directed at outpatients with cardiovascular and pulmonary complaints, to which also some partners of these patients have been added. As the only entry criterion was the intention to stop smoking this study is not hampered by possible threshold effects just mentioned.

Secondly, we present the prediction of smoking status at follow-up. More specifically we address the question "What factors (behavior, physical complaints or situational circumstances) are related to success in smoking cessation for patients with cardiovascular and pulmonary complaints?" For this reason we shall also present data about health

beliefs and psycho-social factors presumably involved in the process of relapse (Janz & Becker, 1984; Lichtenstein, Glasgow & Abrams, 1986).

6.2. Method

6.2.1. Subjects

The subjects were 69 men and 30 women, 82 out-patients from either the cardiology or pulmonology department of the Utrecht University Hospital, the Netherlands and 17 partners. No differences between conditions existed before treatment in age (mean 52.7, s.d. 11.7), number of cigarettes daily smoked (mean 22.1, s.d. 10.0) or nicotine tolerance (mean 6.2, s.d. 2.3). Partners were younger (mean 47.1, s.d. 11.7) than patients (mean 53.5, s.d. 11.2), $T = -2.15$, $p < 0.05$. They were mostly women (64.7 %, $n = 11$) as opposed to the patients who were mostly men (76.8 %, $n = 63$), corrected chi square = 9.6 (1), $p < 0.01$.

6.2.2. Procedure

All subjects had received an invitation to participate in a smoking cessation treatment, signed by the head of the department where the patients were treated. Subjects were randomized within time constraints in two treatment conditions: a behavior modification condition and a non-specific counseling condition. The behavior modification condition consisted mainly of self-regulation, relaxation and cognitive interventions. Contrasting this broad-spectrum approach, the counseling condition focused on group cohesion. More details on the treatments and results until thirteen weeks follow-up were provided in chapter 4. The participants were sent questionnaires at the end of treatment and at 4, 13, 26 and 52 weeks follow-up. Prediction of smoking status at 52 weeks follow-up was attempted for cigarette smoking patients ($n = 65$). This restriction was made for three reasons: Cigarette smoking in particular is a risk factor for the deterioration of the course of cardiovascular and pulmonary diseases. Apart from this, the smoking behavior of a cigarette smoker is different from that of pipe and cigar smokers (e.g. with regard to daily consumption and inhalation), possibly having other determinants. Prediction of smoking status for cigar or pipe smokers, and partners was not attempted because these groups were too small.

6.2.3. Measures

Six questionnaires were to be filled in: a demographical questionnaire measuring sex, age, education, marital status, number of children and profession.

A medical questionnaire contained 44 items relating to bodily complaints besides 2 questions concerning docters' visits. Various bodily complaints, such as a wheezing respiration, breathlessness, or pain in the chest, were measured by their frequency of occurrence on a four point scale: hardly ever, sometimes, often, very often or always.

Another questionnaire assessed smoking related variables. Nicotine dependence was measured by means of a Dutch translation (Cronbach's alpha = 0.53) of Fagerstrom's Tolerance Questionnaire (Fagerstrom, 1978). This 8-item questionnaire measures a behavior pattern that is supposed to be indicative of nicotine tolerance. Besides, smoking behavior was asked, as well as various questions concerning change of smoking behavior. Motivation to change smoking behavior was measured by nine statements varying in degree of intended behavior change. Lowest motivation was represented by the statement "I want to keep smoking the way I do", highest motivation by "I want to stop smoking today". Subjective pressure to stop smoking was operationalized by questions concerning incitements from partner, family, friends, colleagues, physician, commercials and physical complaints (alpha = 0.33).

Quality of life was measured using the Medical Questionnaire for Heart Patients (Erdman, 1981). This questionnaire contains 52 items and consists of four scales: well-being (Guttman's lambda = 0.93), experienced invalidity (lamda = 0.87), displeasure (lambda = 0.80) and social inhibition (lambda = 0.64).

Self-efficacy was measured by a 20-item questionnaire (alpha = 0.88) which measures the perceived certainty of being able to perform various behaviors: observe one's smoking, gradually reduce smoking, refrain from smoking and claim an anti-smoking point of view. The perception was asked with regard to five situations: at home with people, alone, when craving, when in a negative mood and when in a positive mood.

Beliefs were represented by a 24-item questionnaire containg both positive and negative statements about smoking and not smoking. The questionnaire consists of 2 factors: positive beliefs about not-smoking (alpha = 0.73) and negative beliefs about not-smoking (alpha = 0.78).

Several psycho-social variables were measured at 52 weeks follow-up like the number of successful quitters and the number of smokers in the vicinity, subjective pressure to stop smoking and subjective pressure

to smoke, as well as the smoking status of important others. Participants were classified as successful quitters when they indicated not to have smoked in the week before assessment and during the period lapsed since the end of treatment (see also the section data analysis). Whenever analyses are made with respect to smoking status, those indicating not to have smoked the week before assessment are considered to be non-smokers. Thiocyanate (SCN-) and carboxy hemoglobine (COHb) measures to validate self-reports were scheduled at all follow-ups for the participants reporting abstinence. These measures have both been shown to be reliable indicators of smoking behavior (McMorrow & Foxx, 1985). Because of the modest sensitivity of the intended validation method (Griffioen, 1987) and the apparent inconvenience for the subjects to attend the appointments, SCN- and COHb were not used in the data analysis.

6.2.4. Data analysis

6.2.4.1. Survival analysis

Differences in success rate between the two conditions were compared by means of survival analysis (Dixon, 1985). In smoking cessation research application of this technique means that quitters are considered as "survivors" after treatment. Once a participant has relapsed to smoking he is considered as "dead". This very strict criterion of success (only those continuously reporting not to be smoking are regarded as quitters) has only recently been applied (Schneider, Jarvik, Forsythe et al., 1983). The main advantage of this technique is that it has an overall type I error of 0.05 when alpha is set at 0.05, while the former may increase to 0.13 with the more common repeated use of chi square tests (Breteler, Rombouts & van der Staak, 1988).

6.2.4.2. Discriminant analysis

In discriminant analysis a linear combination is made of variables that distinguish optimally between two or more groups of cases. Discriminant function coefficients represent the loadings of the variables involved. Using these coefficients, for all cases a function score can be calculated. The more distinct the mean function scores for each group of cases, the higher the discriminating power of the variables involved. Note that the criterion for smoking status is not identical to that of success and failure. If the data would have permitted so, a tripartition would have been preferred: the successes, the failures and those sub-

jects regaining abstinence after relapse. The latter group being small (n=5), we decided to discriminate between non-smokers (successful quitters and those regaining abstinence) and smokers (the remaining relapsers). Initially all pretreatment variables were considered for analysis. After deletion of those variables with more than 30 % missing data the remaining variables were analyzed with regard to the prediction of smoking variables. The final analysis was performed with those variables corresponding to outcome in previous runs.
Motivation was forced to enter the equation first, followed by a stepwise procedure for the remaining pretreatment variables. The discriminant function was calculated on patients with complete data. This function was used to predict smoking status of all cigarette smoking patients, replacing missing values of any predicting variable by its group mean. No further exploration (e.g. interaction effects) was attempted regarding the limited quality of the data.

6.3. Results

6.3.1. Outcome

Patients and partners did not differ in smoking status at any moment and are treated as a homogeneous group in the survival curve. Success rates for the Behavior modification condition at various f-u moments are 32, 21, 18, 16 and 16 % (see figure 6.1).
These figures are not significantly different from those of the counseling condition: 40, 31, 18, 13 and 10 %. Out of 99 subjects, 12 reported not to have smoked during the entire year follow-up: 6 men and 6 women (n.s.).
Actual rates of non-smokers are higher at various moments because of renewed cessation attempts of the participants. At 52 weeks 17 % reported no smoking during the week before assessment, 58 % reported smoking. The remaining 25 % did not respond. Response rate did not differ between conditions at any moment. As for pretreatment measures, the responders at 52 weeks follow-up did not differ significantly from the non-responders on any of the variables reported on.
As the failing participants relapsed at various moments, a sensible curve of consumption cannot be calculated for this group. At 52 weeks follow-up, 47 cigarette smokers provided consumption data. Compared to their pretreatment weekly consumption (138 cigarettes) their median consumption had declined to 46 cigarettes per week (Two sample median test, $p < 0.01$). No significant difference was found between conditions.

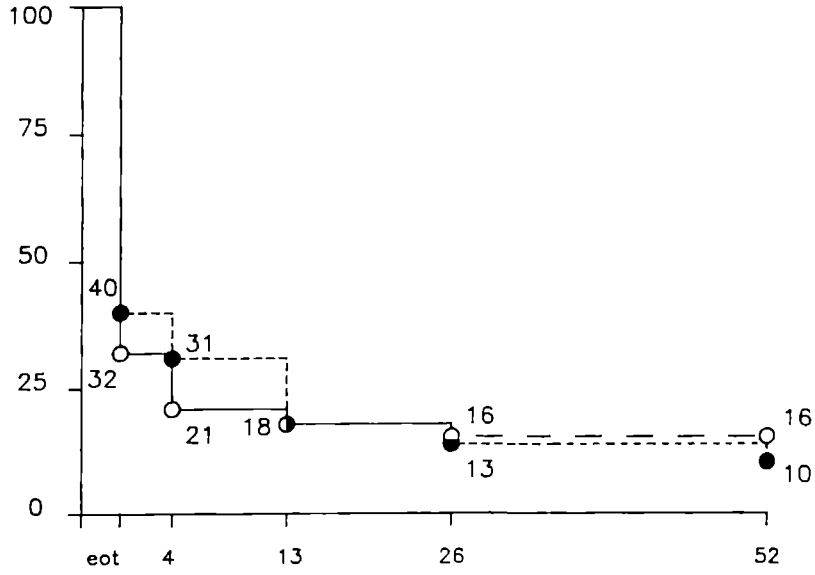

Figure 6.1. Survival curve of success rates in smoking cessation at various moments of follow-up (n = 99).
O—O = behavior therapy, O- - O = behavior therapy (censored),
●—● = non-specific counseling

6.3.2. Discriminant analysis with regard to smoking status

Six pretreatment variables were ultimately selected to predict smoking status at 52 weeks follow-up for the patients who smoked cigarettes before treatment: motivation to change smoking behavior, subjective pressure to stop smoking, the number of cigarettes daily smoked, displeasure, a wheezing respiration, frequency of medication use and level of education. Although not a pretreatment variable, attendance at sessions was added to this set as it appeared to explain success at short term (see chapter 4). Six of these variables distinguished smokers (n = 52) from non-smokers (n = 13) among the patients.

Compared to smokers, non-smokers were characterized before treatment by (in order of descending importance) a low frequency of medication use, a frequently wheezing respiration, high displeasure, a low daily

cigarette consumption and high motivation to change smoking behavior. Attendance at sessions also attributed in this function (see table 6.1).
The canonical correlation coefficient of this linear combination of variables with smoking status was 0.75, ($n=41$) $p < 0.001$.

Table 6.1. Discriminant function coefficients of variables used to predict smoking status at 52 weeks follow-up for patients smoking cigarettes before treatment (n=41).

Variable	coefficient
frequency of medication use	-1.08
frequency of wheezing respiration	1.00
displeasure	0.56
attendance	0.50
daily cigarette consumption	-0.43
motivation to change smoking behavior	0.25

canonical correlation coefficient: 0.75 (n=41).

Classification of smoking status based on these six variables led to 80 % correctly classified cases. 54 % Of the non-smokers were correctly classified (prior probability 0.22), as well as 87 % of these smokers (prior probability 0.78).

6.3.3. Psycho-social aspects

Table 6.2 (overleaf) provides data on psycho-social variables for smokers and non-smokers at 52 weeks follow-up. Reports about the number of successful quitters in their vicinity, or the number of incitements to stop smoking did not differ significantly from pretreatment to follow-up. The proportion of never smoking important others is larger among non-smokers, this difference approaches significance ($T=1.96$, two sided, $p<0.06$). Among smokers daily cigarette consumption correlated negatively with the reported proportion of never smoking important others ($r=-0.29$, $p<0.05$).

6.3.4. Health beliefs

Participants smoking at 52 weeks follow-up believed to a greater extent (66 %) that their complaints were related to their smoking than before

treatment (62 %). However, the proportion smokers who believe that stopping smoking will lead to a decrease in complaints has gone down from 78 % before treatment to 74 % at 52 weeks follow-up.

Table 6.2. Means and standard deviations of psycho-social variables for smokers and non-smokers, at 52 weeks follow-up.

Variable	non-smokers n = 15		smokers n = 43		p-value
	mean	s.d.	mean	s.d.	
# of succesful quitters in the vicinity	3.3	1.4	2.7	1.1	n.s.
# of incitements to stop smoking	1.9	1.9	2.1	1.2	n.s.
# to incitements to smoke	0.4	0.6	0.5	0.7	n.s.
# of smokers in the vicinity	4.2	1.3	4.3	1.2	n.s.
percentage important smoking others	0.29	0.19	0.43	0.28	n.s.
percentage important previously smoking others	0.24	0.23	0.24	0.25	n.s.
percentage important never smoking others	0.47	0.25	0.33	0.23	<0.06

Among the non-smokers relatively more subjects believed their complaints to be related to their smoking before treatment (85 %). At 52 weeks follow-up this percentage decreased to 54 %. An identical decrease was noted in the belief that cessation would lead to less physical complaints. Before treatment 79 % of the non-smokers believed that smoking cessation would lead to a decrease in their complaints, compared to 43 % at 52 weeks follow-up reporting a decrease. However, none of these variables could serve as a predictor for smoking status at 52 weeks follow-up.

6.3.5. Motivation

Among smokers at 52 weeks follow-up motivation to change smoking behavior was lower (mean score = 4.2, s.d. = 1.7) than before treatment (mean = 5.6, s.d. = 1.7, $p < 0.001$). Pretreatment motivation was comparable to that of the other participants. At 52 weeks follow-up, motivation corresponded with self-efficacy expectations ($r = 0.34$, $p < 0.05$), the latter in its turn being negatively related to daily cigarette consumption ($r = -0.55$, $p < 0.001$).

6.4. Discussion

Although a 14 % success rate at 52 weeks follow-up hardly can be considered to be a satisfying result, it should be taken into account that cigarette consumption among the relapsers has decreased to a considerable extent. The low success rate partly is due to strict interpretation of success demanded by survival analysis. However, misreporting of success still is possible, due to the absence of pharmacological validation. Various patient studies have shown misreporting of smoking status, up to 22 % among cardiac outpatients after pharmacological validation (Sillett, Wilson, Malcolm & Ball, 1978). On the other hand, strong concordance between self-reports and measures of smoking among patients with cardiac complaints have been found as well (Morrell, King & Martin, 1986; Ronan, Ruane, Graham, Hickey & Mulchey, 1981). Taking these results in consideration the assumption that at least 5 % of misreporting may have occurred in our study seems justified. Future patient studies are advised to use little intrusive validation measures in order to guarantee a maximum compliance with pharmacological assessment. Saliva thiocyanate would be such an alternative.

With regard to the consumption after treatment we should keep in mind that the figures are obtained from relatively light smokers. The Dutch Foundation for Health and Smoking (1986) found that Dutch smokers probably underreport considerably, we may have to increase the self-reports with about 50 %. Still, the consumption after 52 weeks follow-up is considerably lower than before treatment, without a significant difference between conditions.

It seems appropriate to conclude here that the selection threshold discussed earlier cannot be held responsible for the lack of difference in outcome. Both success rates and consumption figures are alike for the two conditions.

Are we now to conclude that behavior therapy in general has no specific power in the face of cigarettes? Previous trials did not find any

benefit for behavior therapy either (Katz, Heiman & Gordon, 1977; Rabkin, Boyko, Shane & Kaufert, 1984) but as we stated before, this may have been caused by selection factors. The answer is likely to be yes, using the currently described design. More interesting results can be expected from designs relating various programs to participant characteristics, trying to answer the question who profits from which program (cf. Mclellan, O'Brien & Kron, 1980, regarding drug abuse patients).

This brings us to the second theme of this paper: what factors are related to success in smoking cessation? Pretreatment variables distinguished non-smoking patients from smoking patients at follow-up. It should be clear that no definitive conclusions can be drawn, based on these results. Various, particularly medical, variables were handicapped in their predictive power by missing data. The results should therefore be interpreted as a possible and plausible explanation.

Especially the frequency of medication use predicts cessation in this study: smokers took their medication more times daily. If patients use medication regularly they may be lured into the false security that they combat their complaints adequately.

A wheezing respiration is a physical complaint that can not be denied. Whereas pain in the chest or breathlessness can be concealed to a certain extent, a wheezing respiration is clearly audible to every one. Social reinforcement after cessation and physical experiences may account for the predictive power of this variable. As we did not assess either social reinforcement or the course of wheezing, the explanation remains hypothetical.

Though to a lesser extent, low daily cigarette consumption also predicted non-smoking. Previous predictor studies also found light smokers to be more successful than heavy smokers (Eisinger, 1972; Ockene, 1978; Eiser, van der Pligt, Raw & Sutton, 1985). Both behavioral and pharmacological explanations can be applied here. The behavior pattern of relatively light smokers may be more easy to change. From a pharmacological point of view one may suggest that these participants are less addicted to nicotine. Nicotine tolerance however, turned out not to be a predictor of smoking status, possibly due to missing data.

The role of motivation before treatment seems to be a modest one. Yet attendance at sessions has been considered as an indicator of motivation during treatment (Brengelmann, 1978; Glasgow, Schafer & O'Neill, 1981) and our results are similar to those of Brengelmann in that

motivation during treatment weighs more heavily than pretreatment motivation.
Among smokers the motivation to change smoking behavior at 52 weeks follow-up was lower than before treatment. The former could be described by the statement "I'm not sure whether to stop smoking" while the motivation before treatment is better represented by "I want to stop smoking". This is in accordance with results of other researchers (Eiser et al., 1985).
Health beliefs appear to be of minor importance in maintenance of smoking cessation (Pederson & Baskerville, 1982). While at 52 weeks follow-up the majority of relapsed smokers still expected their complaints to decrease if they would stop smoking, only about 40 % of the non-smokers actually indicated that they experienced a decrease in their complaints. This finding implies that part of the novice quitters is to be dissappointed because of lack of reinforcement at the physical level. It remains unclear whether this lack of reinforcement has influenced relapse.
The last issue of this publication concerns the role of psycho-social factors in relapse. Whereas the results with respect to the psycho-social variables show differences supporting social learning theory, these differences are non-significant. Yet, smokers at 52 weeks follow-up report 15 % less "important others who never smoked" than non-smokers, a results that seems meaningful nevertheless. Besides, smokers reporting a high percentage of never smoking important others smoke less than those mentioning a low percentage. These results extend the growing body of evidence concerning the influence of social networks and social support on smoking cessation maintenance (Colletti & Brownell, 1982).
Future studies, combining interventions at the personal and community level may be able to influence these factors, that till today remained unaffected by therapy interventions.

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Chapter 7: A Multivariate model of smoking cessation. LISREL Analysis compared to multiple regression analysis.

M.H.M. Breteler & R. Rombouts. Published in J. Vinck, W. Vandereycken, O. Fontaine & P.Eelen (Eds) Topics in Behavioral Medicine. Annual Series of European Research in Behavior Therapy, Vol. 1. Lisse Swets & Zeitlinger, 1986.

7.1. Introduction

One of the striking problems in the field of smoking cessation is the modest long term result of therapy. Although lately some encouraging results have been found (Lando, 1981; 1982), results often hardly supercede attention placebo effects (Hunt & Bespalec, 1974). Non-specific variables such as age (Jarvis, 1982), and sex (US Dept of Health and Human Services, 1982) often play a role in posthoc analyses. Until now most smoking cessation evaluation studies have put emphasis upon maximizing therapy results, without explicitly using a model of change. This is not to say that the evaluated methods are non-theoretical; but many smoking cessation evaluation studies lack a stated theoretical point of view concerning the behavior change (i.e. the process of smoking cessation) that is achieved. McFall & Hammen (1971) investigated the three non-specific factors appearing in most smoking cessation programs self-observation, program structure and client motivation. Client motivation predicted succes at the end of treatment. Since this study little attention has been paid to the issue of motivation in smoking cessation evaluation studies. Glasgow et al. (1981) found that motivation measured as willingness to read manuals and perform tasks in cessation programs was a predictor for success.

The public health perspective on smoking cessation puts, among others, emphasis on the role of motivation. A prominent guideline for public health studies has been the Health Belief Model (Rosenstock, 1974; Becker et al., 1977). According to this model compliance with preventive health advice and medical regimes depends on health motivation, perceptions of the severity of an illness, beliefs about expenses of action and reactions on various cues.

The Reasoned Action Model (Fishbein & Ajzen, 1975) is a general model for behavior change that shows similarity to the Health Belief Model (HBM). According to the reasoned action model, decisions about behavior follow in a reasonable way from the information people have about the world; as such the model is also based on beliefs. Women who said

they did not want to stop smoking believed negative effects of smoking to be less negative than women who said they wanted to stop smoking (Fishbein,1980). Another concept found in both the Reasoned Action Model and the HBM is social pressure. People act under pressure of their reference group. Fishbein (1980), however, found that beliefs about social pressure are of minor importance compared to beliefs about the act of smoking. Recently Eraker et al. (1985) have extended the HBM with elements of decision theory and self-efficacy theory. The latter refers to the conviction that one can successfully perform the behavior required to produce outcome (Bandura, 1977). People may believe smoking to be hazardous to health, but when they are convinced that they cannot do without cigarettes, they will probably not try to stop. Pederson et al. (1982) and Pederson & Baskerville (1983), studying smoking cessation among pulmonary patients, found that HBM variables did not play a role in a multivariate prediction of smoking behavior. The patient's own prediction about their smoking after 6 month (cf. self-efficacy expectation) proved to be the most potent predictor. Condiotte & Lichtenstein (1981) showed that participants of a smoking cessation program with relatively high self-efficacy expectations at the end of treatment are significantly more often non-smoker at 3 and 6 months follow-up than participants with relatively low self-efficacy expectations. Brod & Hall (1984) found that joiners in a cessation program had higher pretreatment self-efficacy expectations than non-joiners.

Another thoroughly investigated model of behavior change is the cognitive dissonance model (Festinger, 1957). People act according to their cognitions and emotions. When cognitions are in opposition to one another, dissonance develops which people will try to reduce. Erikson (1973) investigated cognitive dissonance theory in smoking cessation. Ex-smokers were more content with themselves after stopping smoking than before. Although psychological and social variables certainly play a role in the process of smoking cessation, the effect of nicotine in smoking cessation cannot be denied. Smokers regulate their nicotine-intake by their way of smoking (puff-volume, number of inhalations) (McMorrow & Foxx, 1983; Pomerleau et al., 1983). Cessation may lead to trembling, sweating, dizziness, disturbed sleep and craving because of lack of nicotine (Fagerstrom 1981; Shiffman, 1982). Several concepts, which tap different mechanisms in the process of behavior change, play a prominent role in the literature discussed above motivation; self-efficacy; cognitive dissonance; social pressure; beliefs and nicotine depen-

dence. Although each concept on its own has been used to explain smoking behavior modification, only few studies have considered the interrelationship of these concepts in smoking cessation research (Pederson et al., 1982; Pederson & Baskerville, 1983). In earlier days of smoking cessation research, studies focused at the act of initial cessation (Bernstein, 1969). Nowadays it is commonly accepted that successful smoking cessation has several stages; e.g. initial stopping and maintenance (Lichtenstein, 1982). Another distinction is made by DiClemente & Prochaska (1982), who distinguish three stages decision to change, active change and maintenance. In the model we present here (figure 7.1) we postulate two stages motivation to stop smoking and maintenance of abstention. In our view initial stopping cannot be separated from maintenance without any arbitrary decision, so we do not. DiClemente & Prochaska (1982), in a discussion on the three stages of their change model, also regard the possibility that what they call maintenance is no separate entity but continued change (their second stage). The stage of motivation in our model is postulated in accordance with the literature discussed above, in order to investigate its role in long term therapy results. This stage shows similarity with "the decision to change" of DiClemente & Prochaska. The influence of the forementioned behavior change concepts in the two stages of our model is supposed to be partly exerted by the self-efficacy expectation (figure 7.1). As such it is possible to investigate the validity of studies that are focused on the role of self-efficacy in smoking cessation (DiClemente, 1981; Condiotte & Lichtenstein, 1981).

We hypothesized many interrelationships, yet expected the influence of social pressure on self-efficacy to be negligible (cf. Fishbein, 1980). Nicotine dependence is not expected to be related to maintenance in the long run (Jarvis, 1982). The aim of this study is to

test the presented model empirically. The model may result in interventions directed on a specific change concept, thus giving way for smoking cessation studies that put less emphasis on outcome and more emphasis on model building. Part of the model (the stage of motivation) was tested among staff of a Dutch banking company.

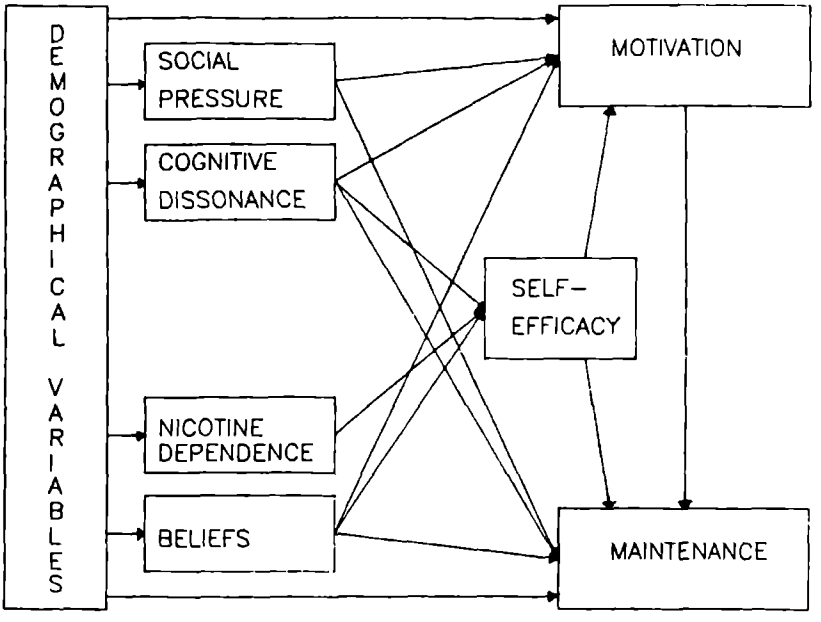

Figure 7.1. A theoretical model for smoking cessation (relationships between independent variables have been omitted for the sake of clarity)

7.2. Method

7.2.1. Subjects

Of 2357 mailed questionnaires 671 copies were returned. This low response (28.5 %) was caused by an expected reorganization within the company, which the researchers were unaware of. This means that the data may be biased and as such we shall have to be cautious in the interpretation of the results. 38.3 % of the respondents was smoker, 32.9 % was ex-smoker and 28.8 % had never smoked. Of 124 smokers we had data on the concepts relevant for the model and analyses were performed on this group.

7.2.2. Procedure

All employees of a department of a nationally operating banking company received a written questionnaire from the company's health department. The employees were informed that the questionnaire was

meant to study the relationship between smoking, health and lifestyle. After two weeks the respondents received a written reminder, in which they were urged to return the questionnaire.

7.2.3. Measures

Most smoking measures are developed by the authors because currently no validated Dutch measures exist that fit the topic of this study. Demographic variables measured are sexe, age, education, civil status and number of smokers in the environment. Motivation is operationalized by six statements varying in degree of intended behavior change. Lowest motivation was represented by the statement "I want to decrease my smoking"; highest motivation by "I want to stop smoking immediately". Each statement was awarded a number. Respondents were asked to tick the statements that applied to them; their motivation is represented by the highest number.

Social Pressure is measured by 7 items concerning social pressure to stop smoking. Respondents are asked whether they have experienced a stimulation to stop smoking by their partner, family, physician, friends, collegues, anti-smoking campaigns or bodily complaints. The number of affirmatively answered items are summed and constitute the respondents score. Internal consistency of this measure is 0.52.

Smoking dissonance is formulated as the difference between the actual number of cigarettes smoked and the number of cigarettes smokers would allow themselves to smoke if they could choose freely. As these two variables are measured in five categories, scores on smoking dissonance can vary between -4 and 4.

Nicotine dependence is measured by a translated version of the Tolerance Questionnaire (Fagerstrom, 1981), which measures nicotine tolerance. The number of previous attempts to stop smoking was also considered as an indication of dependence. This variable was measured in five categories 0, 1, 2, 3, 4 and more previous attempts.

Beliefs are represented by a range of 28 items with positively and negatively tuned statements about smoking and not-smoking. The items were scored on a four-point-scale in terms of agreement with the statement. Scores on negatively tuned items were subtracted from scores on positively tuned items for both smoking and not-smoking resulting in differential beliefs (see Fishbein, 1980). Internal consistency of the beliefs about smoking is 0.45. Internal consistency of the beliefs about not-smoking is 0.46. Self-Efficacy is represented by a 20-item expectancy questionnaire, which measures the perceived certainty of

being able to perform several acts: observe one's smoking, gradually reduce smoking, stop smoking, and claim an anti-smoking point of view. These perceptions are asked concerning five situations: at home with people, alone, when craving, when in a negative mood, when in a positive mood. Internal consistency of this measure is 0.88.

7.2.4. Data analysis

Multiple regression analysis was applied to investigate interrelationships of the observed variables (SPSS, Nie et al., 1975). Variables were entered into the equation when the probability of F-to-enter was smaller than 0.05. Multiple regression analysis shows the proportion of variance in a dependent variabele explained by several independent variables, without regard to error of measurement. This technique does not allow for concurrent explanation of variance in two dependent variables, thus separate analyses were made in which motivation and the expectancy questionnaire were dependent variables.

LISREL analysis, a rigid way to test the existence of a linear structural model, was also applied (Joreskog & Sorbom, 1978). LISREL, in its general form, is characterised by a measurement model and a structural model. The measurement model shows the relationship of the observed variables with the latent variables, and is determined by two equations, the first being

$$\underset{\sim}{x} = \underset{\sim}{\Lambda}_x \underset{\sim}{\xi} + \underset{\sim}{\delta}$$

. x is a vector observed independent variables, Λx is a matrix of loadings on the vector $\underset{\sim}{\xi}$ of latent independent variables; $\underset{\sim}{\delta}$ is a vector of error variance. The observed dependent variables are related to the latent dependent variables in a similar way; here the equation is:

$$\underset{\sim}{y} = \underset{\sim}{\Lambda}_y \underset{\sim}{\eta} + \underset{\sim}{\varepsilon}$$

The structural model shows hypothesized causal relationships among the latent variables; this relationship is characterized by the equation:

$$B\underset{\sim}{\eta} = \underset{\sim}{\Gamma}\underset{\sim}{\xi} + \underset{\sim}{\zeta}$$

B and Γ are matrices of partial regression coefficients (cf. path analysis). ζ represents the error variance of the latent dependent variables, i.e. the variance unexplained by Γ. The parameters of these equations are estimated by a maximum likelihood procedure. LISREL can handle several independent and dependent variables simultaneously, distinguishing between the hypothesized (i.e. latent) variables and the instruments used for measuring them (i.e. observed variables). A chi square test

indicates the likelihood that the structure of observed data (found in either a correlation-, covariate- or raw data matrix) represents the hypothesized model. As it was unknown how the several concepts would interrelate, they were all supposed to relate directly to both motivation and self-efficacy (the dependent latent variables). In subsequent analyses non-significant relationships were deleted from the model untill an optimal fit was achieved. The results are described by standardized solutions, assuming variance = 1 and mean = 0 for the latent variables. Causal effects are represented by gamma's and beta's (regression coefficients).
Looking at the characteristics of this group, we find that men are older than women. Men and women do not differ significantly in the amount of cigarettes smoked per day or the number of years smoked (table 7.1).

Table 7.1. Smokers' Characteristics; frequency, mean and standard deviation.

variable	men	women	significance
% (n)*	64 (85	36 (33)	
mean age (s.d.)	36.3 (6.6)	31.9 (10.8)	p<.05
consumption**	11-15	11-15	n.s.
age smoking onset***	12-15	12-15 .	n.s.

* : 6 respondents didn't answer this question
** : measured in categories of cigarettes
*** : measured in categories of years

7.3. Results

Demographical variables did not substantially relate ($p > .05$) to the other variables contained in the hypothesized model and thus were not analyzed any further. Multiple regression on motivation shows an ultimate multiple r of 0.36. Only smoking dissonance (r^2 enter $= 0.06$; $F = 7.68$; $p < 0.01$), beliefs about not smoking (r^2 change $= 0.04$; $F = 6.63$; $p < 0.01$) and number of previous attempts to quit (r^2 change $= 0.03$; $F = 5.92$; $p < 0.005$) are entered into the equation. Multiple regression on self-efficacy scores results in a multiple correlation of $r = 0.41$. Here beliefs on not smoking (r^2 enter $= 0.11$; $F = 14.64$; $p < 0.001$) and smoking dissonance (r^2 change $= 0.06$; $F = 12.07$; $p < 0.001$) are the entered variables. In the first LIS-

REL analysis, where all concepts were supposed to be related directly, the fit supported the likelihood of the hypothesized model (table 7.2).

Table 7.2. Deletion of relationships in LISREL model for smoking cessation.

cumulative deleted relationships	chi square	df	p
none	20.4	16	.19
beliefs, motivation	20.5	17	.25
smoking dissonance, beliefs	20.7	18	.29
social pressure, smoking dissonance	21.1	19	.33
smoking dissonance, self-efficacy	21.5	20	.37
nicotine dependence, motivation	22.1	21	.39

The deletion of relations in subsequent analyses is shown in table 7.2. Three direct relations between the independent and dependent variables were deleted before the optimal fit (p = .39) was reached.

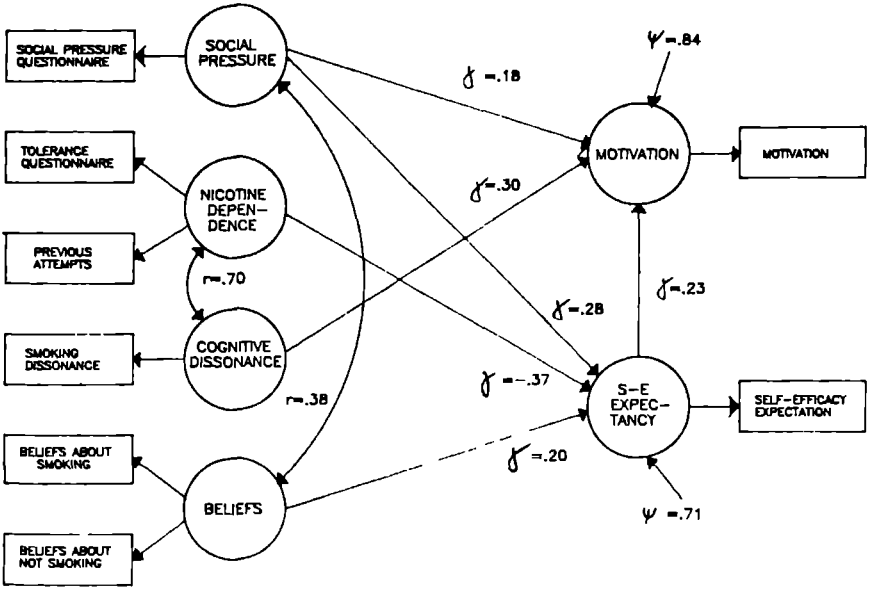

Figure 7.2. A multivariate model for the motivation to change smoking behavior (n = 124).

The final result of the LISREL analysis is presented in figure 7.2. The remaining direct relationships with motivation concern cognitive dissonance (gamma = 0.30), with a minor effect of social pressure(gamma = 0.18). Nicotine dependence exerts indirect influence on motivation via smoking dissonance. Beliefs are related to social pressure and thus influence motivation indirectly. Self-efficacy is mainly influenced by nicotine dependence (gamma = -0.37; the negative sign means that when dependence is high, self-efficacy is low) and social pressure (gamma = .30). Beliefs exert less influence (gamma = 0.20). Indirect influence on self-efficacy can be seen mainly from cognitive dissonance via nicotine dependence on the one hand and from beliefs via social pressure (and vice versa) on the other. Self-efficacy slightly influences motivation (beta = 0.23) Error variances in motivation and self-efficacy are high: 0.84 and 0.71.

7.4. Discussion

Both multiple regression and LISREL explain relatively little variance in the dependent variables. Most relationships are modest of strength, which is not uncommon in smoking research (e.g. Stevens et al., 1982). The operationalizations also may play a role here, information on validity of the operationalizations is still lacking. The interpretation of the two separate regression analyses remains a problem because many variables are interrelated. The relationship between the dependent variables cannot be identified satisfactorily. LISREL analysis handles this problem better. The use of LISREL has three clear advantages: first, it handles the issue of two dependent variables satisfactorily. This method suggests an effect of self-efficacy on motivation. Second, the separation of error of measurement and true score in the linear structural model reveals relationships, different from those in multiple regression analysis. The role of social pressure in self-efficacy expectations remains undetected in multiple regression analysis. Besides these two advantages, several indirect relationships were found, which remain undiscovered by multiple regression. A majority of models in the literature is based upon regression analysis. The results of this study give reasons for doubt concerning the adequacy of regression analysis in testing models. The lack of obligatory apriori hypotheses may lead to the acceptance of conclusions that are insufficiently supported by the data. If we would have happily accepted the results of multiple regression analysis, this would have led to different conclusions. Although LISREL is considerably more difficult to apply, its results are superior

to those of multiple regression and should be preferred whenever possible. As far as implications for smoking cessation are concerned, we shall only discuss the results of the LISREL analysis. First, it is clear that our initially hypothesized model does not hold as far as motivation and self-efficacy are concerned. Social pressure is significantly related to self-efficacy, which was not expected. Bandura states verbal persuasion as a source of self-efficacy (Bandura, 1977). Our operationalization does not account for the way the pressure was exerted and thus may be rather similar to Bandura's verbal persuasion. Neither nicotine dependence nor beliefs are directly related to motivation. Both concepts exert indirect influence though. A result of the LISREL analysis which confirmed our hypotheses is that self-efficacy influences motivation. This result may prove to be valuable empirical support for self-efficacy theory. Bandura (1977) argues that in situations in which motivation plays a role, the importance of self-efficacy expectations for the executed behavior will be diminished. Thus, discrepancies between self-efficacy expectations and successful cessation may be partly explained in terms of an indirect effect via motivation. It is most interesting to investigate the effect of this relationship on maintenance. Yet we must be cautious in the interpretation of this result as it may be biased. Our results show that several concepts may be responsible for smoking cessation motivation. This gives us the opportunity to develop specific interventions. It should be clear that these interventions cannot replace successful interventions as taste saturation and rapid smoking (see Lichtenstein, 1982). They must be seen as additions, pointed at heretofore neglected areas in the process of smoking cessation. Furthermore, the small proportion of explained variance in the model requires modesty in drawing conlusions about interventions. Until now most evaluation studies show that non-specific variables often play a role in the results. With a shift of attention these variables may be incorporated in a model and successfully used in interventions. LISREL analysis is an adequate technique to build such a model.

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Chapter 8. Motivation to change smoking behavior: a revised model.

M.H.M. Breteler, E.H.M. Mertens & R. Rombouts.

8.1 Introduction

Variables that influence smoking cessation can be divided into three groups, according to their main dimension of operation. The first group concerns pharmacological parameters of smoking behavior: novice quitters have to accomodate to the absence of nicotine. Heavy smokers may have become dependent on nicotine and experience the concomittant withdrawal symptoms (Fagerstrom, 1978; Benowitz, 1986). Psychological variables supposed to influence cessation constitute a second group: motivation to change (McFall & Hammen, 1971), self-efficacy expectation (Bandura, 1977, Bear, Holt & Lichtenstein, 1986), and coping skills (Killen, Maccoby & Taylor, 1984). A last group can be distinguished consisting of psycho-social variables like social pressure and beliefs (e.g. Ajzen & Fishbein, 1980), and attributions (Eiser, van der Pligt, Raw & Sutton, 1985). Recent studies in the field of smoking cessation increasingly acknowledge the fact that change of smoking behavior takes place in various stages (Horn, 1976; DiClemente & Prochaska, 1982; Schlegel, Manske & Shannon, 1983; Velicer, DiClemente, Prochaska & Brandenburg, 1985). In accordance with these developments Breteler & Rombouts (1986) presented a preliminary model that addressed the motivation for change of smoking behavior (see figure 8.1). The model explicitly explored the relationships between variables across the three dimensions: social pressure, cognitive dissonance and beliefs (psycho-social variables), nicotine dependence and previous cessation attempts (pharmacological variables) and self-efficacy expectations (psychological variable).

Although the model had a satisfactory fit the explanatory power was low: 16 % of the variance in motivation was explained. Criticism has been uttered concerning the hypothesized role of cognitive dissonance. The operationalization of this concept was defined as the difference between the actual consumption and the desired consumption. Yet this might rather be an indication of motivation itself. Another shortcoming of the preliminary model was the classification of the number of previous attempts as an indicator of nicotine dependence.

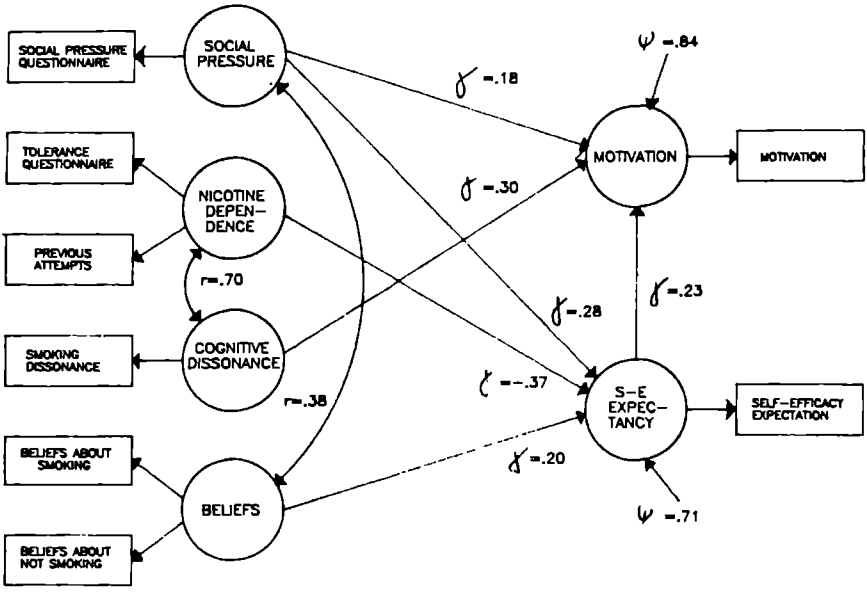

Figure 8.1. A multifacorial model for the motivation to change smoking behavior (n=124).

Many other variables besides nicotine dependence influence relapse (Marlatt & Gordon, 1985; Shiffman, 1982) thus leading to doubts concerning the correctness of the classification. The current study reports on the analysis of a revised model, in which cognitive dissonance is excluded. The number of previous attempts is regarded now as an independent psychological variable. Motivation is operationalized both by intentions to change and the desire to decrease consumption. The effects of these changes on the explanatory power of the model may serve as an answer to the criticisms cited above. Another purpose of this article is to investigate the influence of bodily complaints on the motivation to change smoking behavior among bank employees. Mertens, Breteler & Rombouts (1987) found that incitement by bodily complaints contributed considerably to the explanatory power and likelihood of a similar model among patients with cardiovascular and pulmonary complaints.

8.2. Method

8.2.1. Subjects

Employees of a Dutch nation wide operating banking company received a written questionnaire from the bank's health department. Of 2357 mailed questionnaires, 671 copies were returned. 38.3 % of the respondents were smoker. The current analysis is based on 156 cigarette smokers who provided missing data on maximally one variable. 71% of the subjects are men, 29% are women; seven subjects didn't provide data for gender. Mean age is 35.8 years, mean daily cigarette consumption is 16.1.

8.2.2. Measures

Motivation to change smoking behavior is indicated by two instruments. The intention to change is measured with six statements constituting a scale of intention to change. The lowest score on this scale (1) is attached to the statement "I want to decrease my smoking", the highest score (6) to "I want to stop smoking immediately". If a smoker ticks various statements, the statement resulting in the highest score is considered appropriate. Another measure of motivation to change smoking behavior is the difference between the amount smoked and the amount preferred. We related this measure to the amount smoked, which resulted in a measure "wished decrease in cigarettes".

Self-efficacy expectations are represented by a 20-item expectancy questionnaire, which measures the perceived certainty of being able to perform various acts: observe one's smoking, gradually reduce one's smoking, refrain from smoking, and claim an anti-smoking point of view. These perceptions are measured with regard to five situations: at home with people, alone, when craving, when in a negative mood, when in a positive mood. Response categories vary from "very uncertain" (1) to "very certain" (4). Addition of the scores on items leads to an overall self-efficacy score. Cronbach's alpha of this questionnaire is 0.88.

Subjective pressure to stop smoking is measured by seven sources of incitement to quit as perceived by the smoker: partner, relatives, physician, friends, collegues, anti-smoking commercials and bodily complaints. Scores on this measure are computed by adding the number of sources of incitement named by the subject. The role of bodily complaints is investigated by testing a model which involves only external subjective pressure to stop smoking. The measurement is

identical to that of subjective pressure, yet the incitement by bodily complaints is not included in the measure. The internal consistency of both measures is 0.45.
Nicotine dependence is measured by means of Fagerstroms Tolerance Questionnaire, TQ (1978). This 8-item questionnaire measures behavioral aspects of smoking behavior that are related to pharmacological parameters of nicotine dependence. Scores can vary from 0 to 11. Cronbach's alpha of the TQ is 0.65.
The previous attempts to stop smoking are measured with a question consisting of five categories, ranging from "no previous attempt" (score: 1) to "more than three previous attempts" (5).
Beliefs are represented by 13 statements about smoking and 15 statements about not smoking. The items, which contain both positively and negatively tuned items, were scored on a fourpoint scale. Scores on negatively tuned items were subtracted from scores on positively tuned items (leading to differential beliefs, see Fishbein, 1980). Internal consistency of beliefs about smoking is 0.47, internal consistency of beliefs about not smoking is 0.45.

8.2.3. Data analysis

In accordance with our theoretical considerations two models were tested using LISREL IV (Joreskog & Sorbom, 1978). The main reasons for the use of this statistical program are that it can handle various dependent variables simultaneously and that it allows for the distinction between instruments of measurement and their latent constructs, the latter being of interest rather than the former. Lisrel compares a theoretically derived variance-covariance matrix to the observed variance-covariance matrix. The fit of a model is tested with a chi square statistic. A large chi square/d.f. ratio (with concomittant low p-value) signifies an unsatisfactory fit, i.e. the values in the observed variance-covariance matrix should not be attributed to the model tested. Because of missing data, the matrices of the observed variables were estimated using a maximum likelihood procedure. In subsequent analyses non-significant relationships (with Z-values < 1.96) were deleted from the model until an optimal fit was achieved.
Criteria for optimalization were:
1. Theory prevails over statistics. This criterion concerned two relationships in particular: subjective pressure and self-efficacy expectations were supposed to influence motivation directly. The assumption of a

direct relationship between self-efficacy and motivation was discarded later as described in the section of results.
2. A simple model is preferred rather than a complex model.
3. Increases in the degrees of freedom may not lead to significant increases in chi square. For a more detailed report on the procedures see Mertens et al. (1987). Associations in the model are represented by r's (correlation coefficients), causal effects by gamma's (regression coefficients). The total combined effect of each concept under study is calculated by multiplying the relevant parameters for various pathways of influence. Addition of these products leads to the totally combined effect.

8.3. Results

8.3.1. Scores on the instruments of measurement.

The mean score for intention represents the statement "I want to quit smoking", without any specification of time (see table 8.1). The mean wish to decrease cigarette consumption is, expressed as a percentage, 0.55. Two outlying cases on this measure were excluded from the analysis. These subjects indicated that they wished to smoke more than they currently did. The models were tested on the remaining 154 subjects.

Table 8.1. Mean and standard deviation of variables, measured for a model of motivation to change smoking behavior.

variable	mean	standard deviation
intention to change	3.0	1.8
proportion cutdown	0.55	0.33
self-efficacy exp.	45.9	10.9
social pressure	1.7	1.4
Tolerance Q.	4.4	2.0
previous attempts	2.7	1.4
beliefs about smoking	-8.7	4.8
beliefs about not smoking	16.8	5.0

The mean self-efficacy expectation score represents a relatively low certainty in the expectancies concerning the various acts in the situations questioned. Looking at the independent variables, social pressure

is low with a mean of less than 2 sources that incite smoking cessation. Nicotine dependence can be described as low, using Fagerstrom's cut-off point of a score of 7. On the average, the subjects made one to two previous attempts to quit. The subjects think more positive about not smoking than about smoking.

8.3.2. Model 1

The first model (see figure 8.2) considered the role of external subjective pressure, measured by "social pressure to stop smoking". It was initially tested with all latent variables hypothesized to be interdependent. This initial model had a satisfactory fit (chi square = 22.4, d.f. = 15, p = 0.10). After optimalization, the influence of self-efficacy expectations on motivation to change remained non-significant, yet suggested that high self-efficacy would lead to low motivation. This result caused us to assume that self-efficacy would rather be independent of motivation, leading to a new series of analyses.

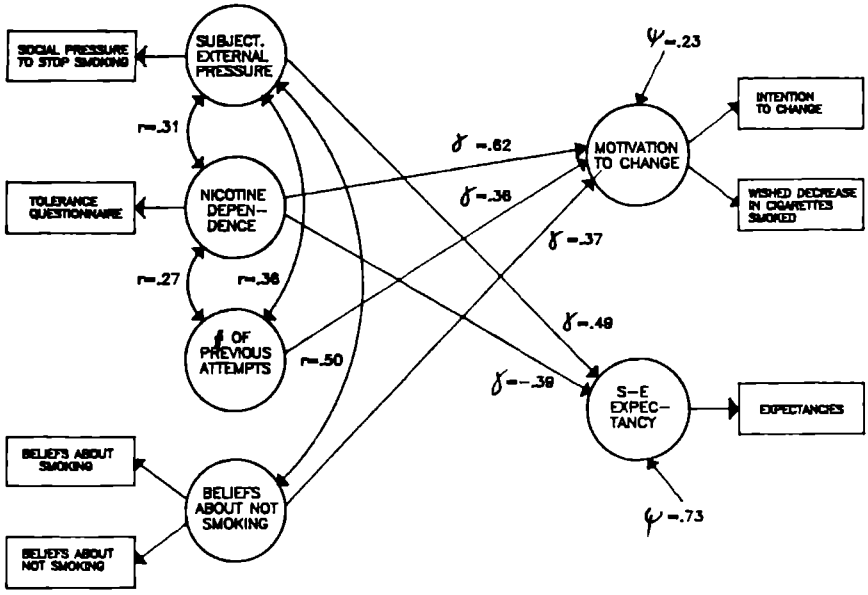

Figure 8.2. A multifactorial model for the motivation to change smoking behavior, involving external subjective pressure (n = 154).

Table 8.2. Variance-covariance matrix of the measured variables of the second, most appropriate model (n=154).

var.	1	2	3	4	5	6	7	8
1	2.268							
2	0.526	4.139						
3	0.516	0.633	2.067					
4	-1.961	0.190	0.018	22.683				
5	1.111	0.104	0.044	-12.832	25.240			
6	0.822	0.805	0.856	-1.824	1.608	3.259		
7	0.124	0.291	0.160	-0.319	0.155	0.223	0.109	
8	3.332	-3.428	1.212	-8.652	17.279	1.897	-0.429	117.281

1 = incitement to quit smoking
2 = Tolerance Questionnaire
3 = previous attempts to quit smoking
4 = beliefs about smoking
5 = beliefs about not smoking
6 = intention to behavior change
7 = proportion wished decrease in cigarette consumption
8 = expectation questionnaire

Table 8.3a. Change in the fit of a LISREL model for the motivation to change smoking behavior (n=154).+

cumulatively deleted relationships between construct A and B		strength of deleted relationship	fit of the model Chi square	d.f.	p
A	B				
none (initial model tested)		–	22.4	15	0.10
previous attempts	beliefs about not smoking	0.00[1]	22.4	16	0.13
nicotine dependence	beliefs about not smoking	-0.01[1]	22.4	17	0.17
previous attempts	s-e expectation	0.08[2]	23.0	18	0.19
s-e expectation	motivation	-0.19[2]	25.2*	19	0.15
beliefs about smoking (error of measurement)	beliefs about not smoking (error of measurement)	-0.14[1]	27.0*	20	0.14
beliefs about not smoking	s-e expectation	0.23[2]	28.8*	21	0.12
subj. external pressure to quit	motivation	-0.05[2]	26.5	22	0.23

+: incorporating subjective external pressure to stop smoking
*: decrease in p-value, yet non-significant increase in Chi square regarding the change in d.f.
1: correlation coefficient
2: regression coefficient

Table 8.3b. Change in the fit of a LISREL model for the motivation to change smoking behavior (n=154).+

cumulatively deleted relationships between construct A and B		strength of deleted relationship	fit of the model Chi square	d.f.	p
A	B				
none (initial model tested)		--	20.1	15	0.17
previous attempts	beliefs about not smoking	0.00[1]	20.1	16	0.22
nicotine dependence	beliefs about not smoking	-0.01[1]	20.1	17	0.27
previous attempts	s-e expectation	0.06[2]	20.5	18	0.31
beliefs about not smoking	s-e expectation	0.20[2]	22.1*	19	0.28
s-e expectation	motivation	-0.21[2]	24.4*	20	0.22
beliefs about smoking (error of measurement)	beliefs about not smoking (error of measurement)	-0.14[1]	26.4*	21	0.19

+: incorporating subjective external pressure to stop smoking
*: decrease in p-value, yet non-significant increase in Chi square regarding the change in d.f.
1: correlation coefficient
2: regression coefficient

A similar event occurred regarding the role of subjective external pressure. Table 8.3a shows the essential deletions of non-significant relationships from this model. The optimal model (chi square = 28.9, d.f. = 22, p = 0.15) explains 77 % of the variance in motivation and 27 % in the variance of the selfefficacy expectation. Nicotine dependence weighs heavily in the direct explanation of motivation (gamma = 0.62). The number of previous attempts (gamma = 0.36) and the beliefs (gamma = 0.37) influence motivation to a lesser extent. Social pressure influences motivation only indirectly by means of its associations with nicotine dependence (r = 0.31), the number of previous attempts (r = 0.36) and the beliefs (r = 0.50). Self-efficacy is mainly influenced directly by social pressure (gamma = 0.49) and nicotine dependence (gamma = -0.39).

8.3.3. Model 2

In the second model which was tested subjective pressure to stop smoking was involved, measured by "incitements to stop smoking". Mean

score on this measure was 2.0, s.d. 1.5. The fit of the initial model again was satisfactory (chi square = 20.1, d.f. = 15, p = 0.17). The variance--covariance matrix of this model is presented in table 8.2.
Again the effect of self-efficacy on motivation turned out to be non-significant, showing a tendency to influence motivation negatively. Table 8.3b shows the essential non-significant relationships deleted from this model, which could have resulted in the statistically optimal model (chi square = 26.5, d.f. = 22, p = 0.23). For theoretical reasons the relationship between subjective pressure and motivation to change was maintained in the model, leading to a slight decrease in goodness-of-fit (chi square = 26.4, d.f. = 21, p = 0.19).

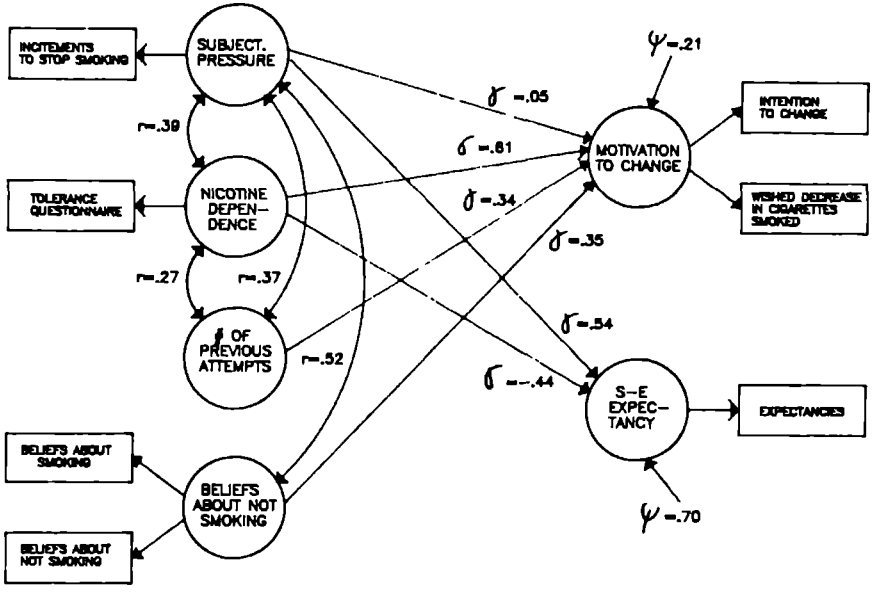

Figure 8.3. A multifactorial model for the motivation to change smoking behavior, involving subjective pressure (n = 154)

This model explains 79 % of the variance in the motivation for change in smoking behavior and 30 % of the variance in the self-efficacy expectation. (see figure 8.3). The relationships are mainly identical to those of model 1, although the incitements to stop appear to be a

more important direct predictor in the self-efficacy expectation (gamma = 0.54) than social pressure alone. Nicotine dependence is estimated to weigh more heavily as well (gamma = -0.44).

8.3.4. Combined effects

The combined effect of indirect and direct effects of the various concepts for both models are shown in table 8.4. In model 1 nicotine dependence exerts the most influence on motivation. Self-efficacy is most influenced by subjective external pressure. Similar results are found in model 2, yet subjective pressure appears more important than subjective external pressure in the explanation of motivation. The total influence of this concept on self-efficacy is identical to that of subjective external pressure.

Table 8.4. Total combined direct and indirect effects of various concepts on motivation to change and self-efficacy expectations, for two models.

variables	motivation		self-efficacy	
	model 1	model 2	model 1	model 2
subjective pressure		.69		.33
subj. external pressure	.60		.33	
nicotine dependence	.84	.86	-.19	-.18
# of previous attempts	.69	.71	.07	.08
beliefs	.59	.62	.17	.17

8.4. Discussion

When we compare these two models we find that model 2 is slightly more complex due to the direct effect of subjective pressure. Taking into account that model 2 explains more variance in both motivation and self-efficacy expectation, we prefer this model for describing the first stage of behavior change in smoking behavior. Though the probability of the revised model is slightly lower ($p = 0.19$) than that of the preliminary model ($p = 0.39$), the explained proportion of variance in motivation has increased substantially. However, we have to keep in mind that the various constructs no longer are the same, and that the power of the revised model is higher because of the larger number of subjects involved. Therefore, we conclude that the results can be considered as a support for the revision. On the average the group of smokers, on which the analyses were based, wants to cut down on their

consumption. 73 % of the subjects reports to have made a previous attempt to quit smoking. The Dutch Foundation for Health and Smoking (1982) reports a national percentage of 50 % of smokers who ever tried to quit before. As such, our group cannot be considered as representative for the Dutch population, a conclusion that could be drawn from the low response (28%) as well. Additional analyses comparing the smokers in the model to other cigarette smokers who returned the questionnaire showed that the latter group perceived less incitement to stop ($p<0.01$). This group also wanted to decrease their consumption to a lesser extent ($p<0.05$). Incitements to stop are reported relatively little and may reflect the rather liberal climate of the Dutch society concerning smoking. Yet our measure of incitements is rather crude and refinements could be made with regard to the frequency and intensity of the incitements experienced. It appears that in the preliminary model the role of nicotine dependence was confounded with the construct of cognitive dissonance. In assessing the total combined effects of each concept, nicotine dependence even appears to influence motivation most. According to the revised model, smokers who are more dependent on nicotine will express a higher motivation to change their smoking behavior but expect less self-efficacy than smokers who are less dependent. This result may explain the limited predictive effect of motivation on behavior (Ajzen & Fishbein, 1980; Eiser et al., 1985). Smokers highly motivated for change apparently are also highly nicotine dependent, thus their change process is likely to require more effort and endurance. The latter in their turn are supposed to be influenced by self-efficacy expectations (Bandura, 1977). Contrary to our expectations motivation and self-efficacy expectations appear to be independent. In the preliminary model self-efficacy influenced motivation positively. A similar result is reported by Eiser et al. (1985). On the other hand, various studies report a lack of relationship among self-efficacy and motivation (Bear et al., 1986; Tipton & Riebsame, 1987). In the current study the influence was not significant and its direction was unexpected: high self-efficacy would lead to low motivation. We choose to consider this result as an artefact, partly caused by the role of nicotine dependence.

In the revised model the number of previous attempts exerts a significant influence on motivation by itself, which supports its separation from nicotine dependence. The positive weight of this variable can be interpreted in such a way that every new attempt (that failed) induces more motivation to change. It is in this way we should look at the

concept of cognitive dissonance rather than the view proposed in the preliminary Breteler & Rombouts study (see chapter 7). Smokers change their cognitions according to their behavior. Although this mechanism cannot be investigated thoroughly using the current design, the results are in accordance with cognitive dissonance theory. It turns out that the incitement to stop smoking, exerted by bodily complaints contributes to the model in two ways: the construct incorporating this variable weighs more heavily in the explanation than the one without, resulting in larger proportions of explained variance in both motivation and self-efficacy expectations. Apart from this effect, the model involving bodily complaints has a higher probability. These results are in accordance with those found among patients with cardiovascular and pulmonary complaints (Mertens et al., 1987). With regard to the non-significant direct effect of subjective pressure we would like to comment that it only shows a part of the picture. What matters most is the total effect of any of the independent variables on the dependent ones. Then we find that the total effect on motivation is increased, yet the total influence on self-efficacy remains unchanged. As far as interventions are concerned we must acknowledge the limited impact of the constructs under study. In spite of the fact that motivation has been shown to influence behavior, the relationship is not perfect as we noted above. From a methodological point of view we should keep in mind that the relationships presented here are maximum likelihood estimates. The measures used in this model can also be refined from a psychometrical point of view. The modest internal consistency of most measures indicates the need for further developments. This concerns also the TQ of Fagerstrom (1978). Replication is needed in order to assess the stability of these estimates, especially because after correction for the number of degrees of freedom we have to postpone our conclusion with regard to the probability of the model (Mertens et al., 1987). For this reason we can only speculate about one finding that may be of major importance. Whenever a smoker perceives bodily complaints as an incitement to quit smoking, its role in motivation appears to be an important one. Interventions addressing this mechanism can be imagined at various levels: mass media campaigns focusing on common smoking related bodily complaints, folders commenting on this topic, and at the personal level counseling of smokers (e.g. by physicians), discussing the role of the smokers' behavior and its relation to their complaints.

We hope that the results presented in this article may serve to stimulate the reader to further investigate the various stages of change in

smoking behavior. Further developments in measures, the use of multiple indicators and large databases can provide more knowledge on the processes essential in smoking cessation.

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Chapter 9: Motivation to change smoking behavior: Fitting a model among patients with cardiovascular and pulmonary complaints.

M.H.M. Breteler, E.H.M. Mertens & R. Rombouts. Published (in Dutch) in Tijdschrift voor Alcohol, Drugs en andere Psychotrope Stoffen.

9.1. Introduction

A recent cartoon shows a smoker saving wrappings of cigarette packets. If he has saved enough, he can get a free treatment in a smoking cessation clinic. This view cynically illustrates current ideas that the process of smoking cessation already starts before the actual behavior change.

The Dutch Foundation for Public Health and Smoking speaks of dissonant smokers when these have made an attempt to quit. The Foundation estimates the percentage of dissonant smokers to be about 50% (Foundation for Smoking and Health, 1982). Among patients with cardiovascular and pulmonary disease this percentage is even 70% (Breteler, Rombouts & Mertens, 1987). The Dutch term for smoking cessation ("stoppen met roken") in the sense of plain stopping smoking is somewhat poor because it is too superficial. Both extinguishing a cigarette and giving up the habit of smoking can be implied. It would be better to use smoking abstinence ("rookabstinentie") or smoking withdrawal ("rookontwenning") as these refer to purposefully refraining from tobacco use. When we speak of smoking we will only refer to smoking of cigarettes, unless mentioned otherwise. On account of the hazardous effects on health this smoking behavior has been studied most.

In order to explain smoking cessation several models have been proposed. These models can be subdivided according to their main dimensions: pharmacological, psychological or psycho-social. Although these three dimensions are interwoven in reality, we will discuss them separately as far as possible. With this, the emphasis will be on the motivation to change behavior. Motivation is mostly operationalized as the intention to perform a behavior (Fishbein, 1980; Eiser, 1982). Therefore, this term should be distinguished from the motives of behavior change, like e.g. " being a good example to the children".

9.2. Psychological models

On the psychological level Horn (1976) has developed an influential model. This model consists of four stages: 1) contemplation to change, 2) the decision to change, 3) short term change and 4) long term change.

On this model some variants have been developed among which a simpler one [6] consisting of three stages: the decision to change, active change and maintenance of change. In a series of publications of several researchers this model has been extended to five stages (McConnaughy, Prochaska & Velicer, 1983; DiClemente, Prochaska & Gibertini, 1985; Velicer, DiClemente, Prochaska & Brandenburg, 1985). These are: (1) precontemplation to change (2) contemplation to change (3) action (4) maintenance of change and (5) the relapse stage. Schlegel, Manske & Shannon (1983) have developed a model consisting of seven stages: motivation, preparation, exercise, initiation, transition, coping and self-concept.

Bandura (1977) argues that the self-efficacy expectation with regard to a behavior is crucial for its performance. Many smokers know that smoking cessation is better for their health. However, if they think they are not able to quit successfully, they will not even try (according to Bandura). Research has shown that smokers applying for a smoking cessation information session can be distinguished from non-participants by a higher self-efficacy expectation (Brod & Hall, 1984). The psychological models discussed have three stages in common: a period of contemplation to quit smoking, the actual smoking cessation and its maintenance. This article focuses exclusively on the first stage, particularly on the motivation to change smoking behavior.

9.3. Pharmacological models

Pharmacological models especially describe the role of nicotine. This substance acts upon nicotine receptors in the central nervous system. Homeostatic models suppose that when a smoker experiences the pharmacological effects of nicotine, the central nervous system produces an adaptation reaction nullifying this effect (Wikler, 1973; Solomon & Corbit, 1973). Stimuli coupled with the use of nicotine (e.g. a cup of coffee) appear to evoke an adaptation reaction in itself (classical conditioning). Among quitters this results in the much reported "craving for a cigarette". There are also indications for a mechanism that maintains a minimum level of nicotine in the body (Pomerleau, Fertig & Shanahan, 1983). Among others this can be deduced from the fact that smokers of low-nicotine and high-nicotine cigarettes consume equal quantities of nicotine (Benowitz, Hall, Sherning et al., 1983). So, smokers regulate their nicotine intake. With smoking cessation this regulation mechanism is disturbed.

Apart from this, it is supposed that smokers with a certain smoking pattern develop physical dependence on nicotine (Fagerstrom, 1982). A group of smokers with high nicotine dependence was more successful in quitting smoking after psychological treatment with nicotine chewing gum than a similar group that received psychological treatment with placebo gum.
Leventhal & Cleary (1980) combine the results mentioned above into what they call the "multiple regulation model". The core of this model is that smoking has a function in the regulation of emotions. Diversions from a hedonic balance caused by either internal or external cues lead to smoking behavior. An empirical test of this model has to take place yet. Thus nicotine appears to be a determinant of smoking behavior with the regular smoker, but it explains results in smoking cessation insufficiently. The role of nicotine with regard to motivation to behavior change has hardly been investigated up till now. In a previous study no direct influence of nicotine dependence on motivation was found (see chapter 7). Nicotine dependence influences the self-efficacy expectation negatively, that is to say the more dependent a smoker the lower his self-efficacy expectation. This expectation influences motivation. The higher self-efficacy expectation the stronger the motivation to change behavior. The results of this study are restricted in that only a small part of the variance in motivation was explained by this and other concepts. Manipulation with mecamylamine, a preparation blocking the effects of nicotine, reduces the appreciation of cigarettes among smokers (Stolerman, 1986). For the time being mecamylamine is unsuitable for application with interventions because of side-effects. The extent to which this substance leads to a stronger motivation to behavior change remains unclear.

9.4. Psycho-social models

An important model at the psycho-social level is the reasoned action model (Fishbein, 1980). This model is based on the beliefs that people have about the world. Applied to smoking this model assumes the intention to stop smoking as the main direct predictor of behavior. The intention to stop smoking is explained by a weighed combination of the evaluation of ones own smoking behavior and the evaluation of the opinion of important others about that behavior. Thus smoking women who thought more negatively about their smoking than other women also expressed a stronger intention to quit smoking (Fishbein, 1980).

In the Health Belief Model (HBM) (Becker, Haefner, Kasl et al., 1977) health motivation is a determinant of (preventive) action. The belief about the severity of a certain disease and the vulnerability for that disease also plays an important part. A review by Janz and Becker (1984) shows that the subjective barrier to start action, another element of the HBM, is most consistently reported on in the literature. The higher the perceived barrier, the less (preventive) action is taken.
Another psycho-social model that has been tested with smokers is Weiner's attribution model (Eiser, Van der Pligt, Raw & Sutton, 1985). Attributions are causal explanations of behavior. Among others smokers base their attributions about their previous attempts to stop smoking on observations with others. Its results can be attributed to stable versus instable causes and to internal versus external causes. With this application too motivation is the most direct predictor of cessation attempts. Smokers who attribute the failure of their previous attempt to stable factors have a lower expectation of success than smokers who do not. Although this model shows significant relationships, the proportion of explained variance is rather small.

9.5. A multifactorial model

Looking at these models the boundaries between pharmacological, psychological and psycho-social dimensions appear to be vague. Pharmacological effects often influence psychological experiences. Also the distinction between psychological and psycho-social rather seems a fluent transition than a precise boundary. Self-efficacy plays a part in both the HBM and attribution theory. Although the term "self-efficacy" is not explicitly mentioned in the HBM the definition of the concept "barrier" contains an estimation of ones own capacities (Janz & Becker, 1984). The nature of attributions (attributions to stable or instable factors, etc.) is connected with the self-efficacy expectation.
Various concepts appear to be able to explain partly the change of behavior. From this we conclude that an adequate model for smoking cessation has to comply with a number of demands, namely: (1) it has to describe various dimensions, (2) it has to account for interactions and associations of relevant concepts and (3) it has to consider the various stages of behavior change.
From this consideration a model has been constructed for the first stage of behavior change, the motivation to stop smoking.
The research question we try to answer with the model is: "What factors (behavior characteristics, physical complaints, (situational) circum-

stances) are connected with the motivation to stop smoking?" The model investigates the relationship of the motivation to change of smoking behavior and the self-efficacy expectation (psychological dimension) with nicotine dependence (pharmacological dimension), complaints and previous behavior (psychological dimension) and social pressure and beliefs (psycho-social dimension). It is based on the experience gained in a study with the staff of a banking corporation (see chapter 7).

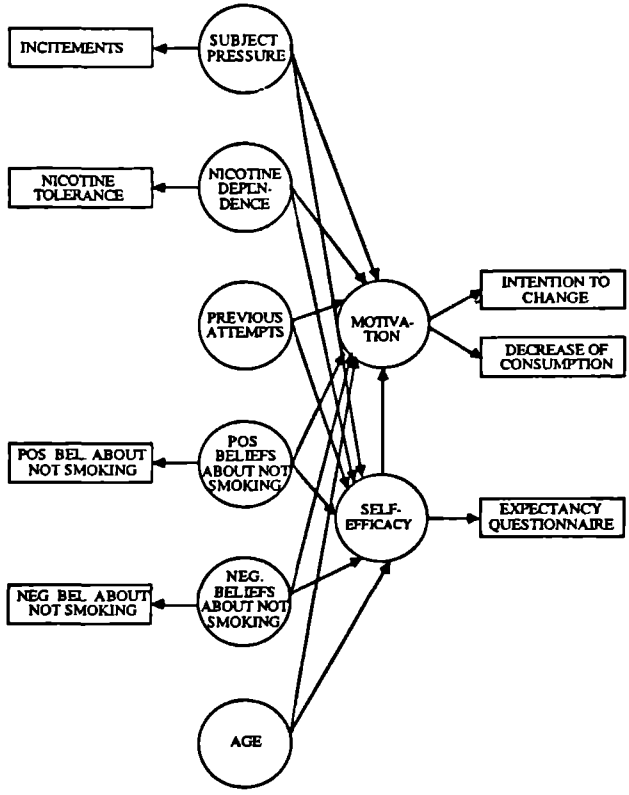


Figure 9.1. A theoretical model for the motivation to change smoking behavior (interdependencies between the explaining concepts have been omitted)

In that study a preliminary model for the motivation to change smoking behavior was investigated. A therein postulated effect of cognitive dissonance has been omitted in the more recent model.
Cognitive dissonance was operationalized as the difference between the actual consumption and the consumption if one could choose how much one wanted to smoke. A point of criticism of this variable is that it is rather an indicator of intention to change than a causal dissonance. It is possible that this confusion played a part in the limited empirical power of the preliminary model. In the more recent model the discussed variable is considered as an indicator of the intention to change. This procedure leads to better insights in the above mentioned discussion. Another difference between the models is that the number of previous attempts to quit is regarded to be a separate independent variable in the more recent model. In this article we describe the development of this more recent model.

9.6. Method

9.6.1. Subjects

The study is based on a randomized sample of patients of the Utrecht University Hospital. Criterion for participation was the visiting of the outclinics cardiology or pulmonology in 1984. Foreign patients and patients taking part in other social-scientific research were excluded from participation. 1000 patients were sent a written questionnaire. 676 patients returned the completed questionnaire. 228 respondents (38.3 %) smoked in one way or another, of whom 171 were cigarette smokers. The model is tested on data of 127 cigarette smokers. The remaining 44 cigarette smokers had data missing on more than two variables of the model. The percentage of men in the studied group amounts 68 %, mean age is 49.1 years (s.d. 13.2). The reported daily cigarette consumption is 15.4 (s.d. 9.3).

9.6.2. Instruments of measurement

Nine instruments of measurements were used for the model: three for the independent and six for the dependent variables (see figure 9.1 for a survey of concepts and operationalizations).

Table 9.1. Number and percentage of patients, classified according to the categories of intention for behavior change.

Statement	n	%
I want to keep smoking the way I do	16	12.6
I doubt whether to reduce	10	7.9
I want to reduce	14	11.0
I doubt whether to stop	31	24.4
I want to stop smoking	28	22.1
I want to stop smoking this year	8	6.3
I want to stop smoking within three months	5	3.9
I want to stop smoking within this week	1	0.8
I want to stop smoking today	14	11.0
Total	127	100.0

The intention for behavior change has been measured by means of a nine point scale. The statement "I want to keep smoking the way I do" is the weakest intention for behavior change. We consider the statement "I want to stop smoking today" as the strongest intention for behavior change (scores: 1-9; see also table 9.1).

Another instrument of measurement for motivation for behavior change is the wished percentage decrease in consumption. The respondents have been asked " How many cigarettes would you allow yourself to smoke if you could choose?" The answer on this question has been subtracted from the reported cigarette consumption. Because a higher consumption allows for larger differences the latter have been expressed as a percentage of the consumption. This variable has been entered in the model with three categories: 0 (percentage < 0), 2 ($0 <$ percentage $<$ 70), and 4 (percentage $> = 70$).

The self-efficacy expectation has been measured with a questionnaire of 20 items. The questionnaire measures the probability with which the respondents estimate to be able to perform various behaviors. These behaviors are: observing one's own smoking, decreasing consumption, not-smoking and expressing a non-smoking point of view. These behaviors concern five situations: at home when with others, alone, when craving, when in a negative mood, when in a positive mood. Due to a

large number of missing data this measure has not been involved in the testing of the model.
In order to assess the subjective pressure to change smoking behavior, it was asked by whom or what the respondents were stimulated to stop smoking. Seven sources of incitement were measured, i.e. the partner, family members, physician, friends, collegues, anti-smoking advertisements and bodily complaints. With the first six sources the incitement is external and of a social character, whereas it is internal with complaints. The sum of the number of stimulating sources is the score on this variable. Minimum score is 0, maximum score is 7. Cronbach's alpha = 0.33.
Nicotine dependence has been measured by means of Fagerstroms Tolerance Questionnaire (TQ) (1982). This instrument measures behavioral aspects of smoking that are associated with fysiological parameters of nicotine dependence, like inhaling, smoking with illness and nicotine level of the cigarettes (score 0-11; alpha = 0.53).
The number of previous attempts has been measured using six categories, ranging from 'no attempt' to "five attempts and more" (score 1-6).
By means of a list with 24 statements about smoking and not-smoking the attitude towards both was measured. As it has been shown that attitudes may be multidimensional (Grube, Morgan & McGree, 1986), we first applied factor analysis to this questionnaire. This resulted in two factors, of which the first is interpreted as a positive attitude towards not-smoking (11 items, alpha = 0.73). We regard the second factor as a negative attitude towards not-smoking (8 items, alpha = 0.78).
The age of the patients was measured using 11 categories, the first category concerning the age of 15 to 19 years, the last 65 years up to 74 years of age. Using class means this variable has been transformed into a semi-continuous variable.

8.6.3. Data analysis

For the development of the model, LISREL IV was used (Joreskog & Sorbom, 1979). With this method it is possible to discriminate between latent and observed variables. From a methodological point of view this allows distinction between concepts and their operationalizations. Both structural associations between the concepts among themselves and between the concepts and their operationalizations (error of measurement) can thus be studied. We argued before that this method, if possible, deserves preference over current methods as multiple regression.

Several dependent variables can be explained in one single LISREL model. Apart from this it is possible to use more than one operationalization, which ameliorates the measurement of a concept. Regression analysis is restricted to the observed variables and does not have the options just mentioned.
In the analyses of the model we used the variance-covariance matrix of the previously decribed instruments (see table 9.2). This matrix is based on a maximum likelihood estimation with data of subjects with missing data on maximally two variables. The variance-covariance matrix presents the association between the operationalizations. LISREL computes the probability that this association is caused by a structure of latent (theoretical) concepts. A chi square test indicates the fit of the assumed model. Parameter estimates that do not differ significantly from zero (to be judged by using Z-values) are set to zero in consequent analyses. Thus, a model has been investigated exploratively, in which motivation for behavior change is explained by experienced social pressure, nicotine dependence, previous cessation experience, and attitudes towards not-smoking. Changes of the model lead to changes in chi square. While implementing changes, three considerations were present. 1. Theory is considered more important than statistics: the maintenance of theoretically plausible relationships is considered to be more important than optimizing the fit. 2. A simple model is preferred over a complex model. 3. In the light of the foregoing, changes in chi square may not be significant, regarding the increase in degrees of freedom. The results are presented by means of standardized solutions. This means that variance of the concepts equals 1 and their mean equals 0.

9.7. Results

The intention for behavior change is presented in table 9.1. It turns out that a mere 87 % of the patients do not wish to remain smoking the way they do now. Mean score is 4.4 (s.d. 2.3, range: 8) which represents the statement "I doubt whether to stop smoking".
With regard to consumption 33.1 % indicates not to wish to decrease, 35.5 wants to decrease consumption partially and 34.1 % wants to decrease substantially or quit smoking altogether.
The role of self-efficacy cannot be investigated in this study, due to the large number of missing data. Therefore, the variable has not been included in the analyses of the model.

Table 9.2. Variance-covariance matrix of the instruments of measurement of figure 1, with exemplon of self-efficancy (n=127).

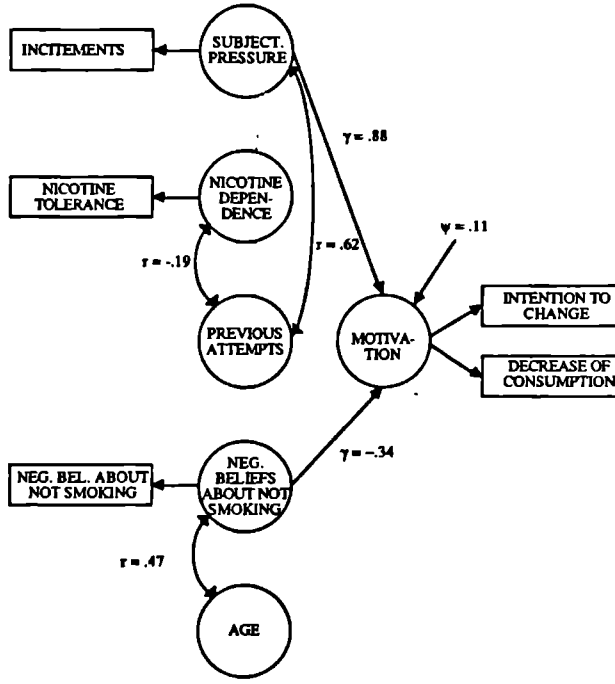
var.	1	2	3	4	5	6	7	8
1.	5.147							
2.	1.609	2.605						
3.	0.988	0.665	1.265					
4.	-0.501	0.746	-0.003	4.979				
5.	1.819	0.746	0.716	-0.547	3.207			
6.	-0.405	1.453	-0.134	0.094	1.393	36.999		
7.	-3.073	-1.059	-0.651	0.759	-0.286	3.659	23.956	
8.	-1.642	-0.791	-0.357	0.597	-0.330	0.824	5.047	6.616

1 = intention for behavior change,
2 = reduction,
3 = incitements,
4 = nicotine tolerance,
5 = previous attempts,
6 = positive attitude toward not-smoking,
7 = negative attitude toward not-smoking,
8 = age.

The mean score on the instrument of measurement for subjective pressure is 1.6 (s.d. 1.1, range: 6). Two persons indicate to have been incited to quit by six sources.
The mean score on the TQ is 4.7 (s.d. 2.2, range: 10). Fagerstrom puts the cut-off point for low and high dependent at a score of seven; this means that the group as a whole may not be considered as high dependent on nicotine (Fagerstrom, 1982).
On the average the patients report to have made two previous attempts to quit smoking (s.d. 1.8, range 5).
The scores on the variable "positive attitude towards not-smoking" have a range of 26. The mean is 24.7 (s.d. 6.1), which implies that most subjects vary between a little disagreement and a little agreement with the used statements. Mean score on the variable "negative beliefs towards not-smoking" is 13.4 (s.d. 4.9, range: 23). The respondents on the average disagree or disagree a little with the statements of this scale.
The group for which the model was tested appeared to be younger (mean 49.1 yrs, s.d. 13.2) than the remaining cigarette smokers (mean 54.2 yrs, s.d. 12.8), $p<0.05$. The studied group also experienced significantly ($p<0.005$) more incitements to stop smoking than the remaining

cigarette smokers (mean 0.9, s.d. 1.4). A third difference is found with the variable "wished decrease" (chi square is 7.6, d.f.=2, $p<0.05$). Relatively more people of the remaining cigarette smokers want to stop smoking rigourously.

In the first model we assume that all concept are associated, all concerning parameters are estimated freely. This results in a fitting model (chi square = 18.9 (11) $p=0.06$). The explanatory power regarding motivation is high: only 5 % of the variance in motivation remains unexplained. The positive attitude regarding not-smoking is not related to any other variable in the model and no longer appears in further analyses.



r = correlation-coefficient, γ = regression-coefficient, ψ = unexplained variance

$chi^2 = 21.7$ (19)
$p = 0.30$, N = 127

Figure 9.2. A multifactorial model for the motivation to change smoking behavior.

The model of figure 9.2 appears to be the optimal model. On the basis of the statistical procedure we would have to conclude that the negative attitude towards not-smoking is unrelated to the motivation for behavior change: the parameter does not differ significantly from zero. However, on the basis of theoretical considerations we have maintained this relationship: also in previous studies this variable plays a role (Fishbein, 1980; Breteler & Rombouts, 1986).
If more relationships between concepts would have been deleted than in figure 9.2, the model would fit worse and would loose explanatory power. Chi square = 21.7 (19), p = 0.30 in this optimal model.

9.8. Discussion

The data show that the motivation to change smoking behavior among the patients is rather weak on the average. Yet 87% of the patients does not want to keep smoking as they are doing now. One out of five patients even indicates to want to stop smoking within a year. About 13 percent of the patients with cardiac and pulmonary complaints appears to want to keep smoking the way they do now. If we interpret this result by means of a model of behavior change (DiClemente, Prochaska & Gibertini, 1985) the greatest part of the patients appears to be in the stages of relapse and contemplation to change.
It is conspicuous that on the average the patients report to be incited to quit by few sources. This can imply that the environment exerts little pressure, that is to say little frequent or little intensive. On the other hand the patients may be relatively insensitive to this pressure.
The analyses show that particularly the older respondents think negatively about not-smoking.
Before discussing the results with the help of the literature the psychometrical part of the model deserves attention. The analyses concern a selected group of patients because of missing data. Mainly younger patients appear to fill in the questionnaires completely. The role of self-efficacy could not be investigated on account of too large a number of missing data. The explanatory power of the model might have been greater if this variable could have been involved in it. The format of the questionnaire for self-efficacy may have been confusing for the older patients. The questionnaire asked for the certainty with which one thinks to be able to perform four acts in five situations. Each situation was mentioned only once and consequently had to be borne in mind with each act. Often only one act was marked per situation as if

it concerned a choice. In order to be able to prevent this problem in the future, we consider to mention the situation in the same sentence with every act.
An analogous explanation can be given for the lower number of incitements reported by the patients of whom the data were insufficient for testing the model. It is possible that these differences can be traced back to missing data as the latter cannot be discriminated from denying responses to this variable because of the scoring format. Considering the differences in age it is not astonishing that in the investigated group a smaller number of persons wants to decrease their consumption rigorously. For these reasons the model seems to be applicable with patients up to middle age. With older patients caution should be considered.
The reliability of the measures is low. LISREL provides the opportunity to include the error of measurement in the model. So, a low reliability does not prevent the testing of a model. Because of the few indicators for the concepts identification problems arise that have been solved by entering the reliability. This means that a correction for the number of degrees of freedom needs to be made. Even if we do so, we do not have to reject the model (chi square = 21.7 (13), $0.05 < p < 0.10$). While interpreting this optimal model we should consider that a number of modification steps have been made. With cross validation this may lead to a lower fit of the model than with the current data. Also because the number of 127 subjects is relatively small for a LISREL model, we shall have to be conservative in our conclusions.
In the literature on smoking cessation nicotine is regarded as an addictive factor (Leventhal & Cleary, 1980; Stolerman, 1986). Therefore, it is an interesting result that nicotine dependence appears to play no important role in the motivation for change of smoking behavior. This result is in accordance with the results of the beforementioned study among banking staff. In that study this concept exerted an indirect influence via the self-efficacy expectation, a variable that could not be involved here because of missing data. Nicotine dependence is only indirectly related to subjective pressure to quit smoking via the number of previous attempts and the relationship is weak. Also the attitude towards not-smoking influences motivation without intervention of nicotine dependence. This indicates that in the stage of contemplation to quit smoking the psycho-social dimension weighs heavy for the patients. The pharmacological dimension does not play an important role in this study. Yet we should not forget that the instrument of measure-

ment for nicotine dependence concerns behavior patterns. A strict distinction between physical and psychological addiction then is not quite possible.

The most important explaining variable in the model is the subjective pressure to stop smoking. If smokers experience many incitements from their environment they are more concrete in their intention to change behavior than smokers who experience less incitements.

From clinical observations we know that smoking by patients is sometimes considered lightheartedly: "Well, he has so little already.. should one take that away as well?" The model suggests that with increasing subjective pressure to stop smoking the motivation for behavior change increases along. In accordance with this, smokers experiencing high subjective pressure to stop smoking report more previous attempts to quit than those experiencing little pressure to stop.

Another conclusion made with regard to this variable is that the incitement experienced by complaints appears to be an important one. If a model like this is tested with exlusively the external pressure (comparable to the social norm of the Reasoned Action Model) the proportion explained variance is lower as is the weight of this concept in the explanation (Mertens, Breteler & Rombouts, 1987). Whether one does or does not experience complaints as an incitement for stopping smoking seems to influence the motivation for behavior change substantially. This is in accordance with the results of Eiser (1982). This author reports that smokers who worry most that cigarette smoking affects their health have the highest probability to be "dissonant" smokers.

The number of previous attempts to stop seems not to be related directly to motivation for behavior change. Because of the strong association with subjective pressure this concept indirectly does play a part in motivation.

The attitude towards not-smoking has direct influence on the motivation for behavior change, be it to a lesser extent than subjective pressure. This concept has been maintained on theoretical grounds, from a statistical point of view this effect is not significant. Also in the preliminary model beliefs appeared to be a variable that has a modest effect on motivation, that should not be neglected, however.

By the incorporation of the attitude towards not-smoking the currently described model has some similarity to the Reasoned Action Model. In a study on that model, applied to smoking, the beliefs of smokers about what others think of their smoking plays only a secondary role (Fishbein, 1980). However, in the described model subjective pressure is the

most important explaining variable. Possibly cultural differences play a part here, or is it a consequence of the investigated group, patients with cardiovascular and pulmonary complaints. Re-analysis of the model among banking staff can clear this issue in the future. In the Reasoned Action Model the effects of attitude and norm are added, it is an additive model. Grube, Morgan & McGree (1984) argue among others that a correspondence and interaction of subjective norm and attitudes should be incorporated. The model described here can be regared as such a variant. From the foregoing it appears that interventions, based on the model, must be of a speculative character. Apart from the methodological restrictions of the model, motivation does not predict behavior completely (Eiser et al., 1985). Yet a number of interventions can be pointed to. Regarding the importance of social pressure the environment of the patients is a subject for education about smoking and its consequences. This applies especially to the partner of the patients and the medical and para-medical staff. These group have considerable influence on the patient and can point to the role of smoking in their complaints. Therefore, it seems important that particularly they incite the patient to stop smoking and and give support in an attempt to quit. Dutch physicians however, do regard advice to stop smoking as their responsability, but acknowledge their model function only to a minor extent (Adriaanse, Van Reek & Van Zutphen, 1987). Among American physicians the advice to appoint a quit date and a schedule of follow-up visits appeared related to the percentages of patients that stopped smoking (Cummings, Giovino, Emonts, Sciandra & Koenigsberg, 1986). Although this result does not follow from the currently described model, it is in line with it. Intervention research based on the model will have to show which interventions are the most efficient.

First, in a validation study with more subjects than in the current study, it is needed to find the extent to which the estimates are replicated.

9.9. Acknowledgement

With thanks to Drs. Th. Luijben for advice with regard to the change of the various LISREL-models.

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Chapter 10. Summary and discussion

10.1. Summary

10.1.1. Summary in English

In chapter 1 the stage of smoking cessation research is settled. General characteristics of smoking comprise pharmacological, psychological and psycho-social factors. It is shown that prevalence and consumption in the Netherlands respectively decrease and stagnate. The hazardousness for health, particularly with regard to cardiovascular disease, COLD and lungcancer is considered superficially. Smoking cessation theories and interventions are reviewed concisely. The introduction ends with the presentation of the two research questions investigated:

- 1. What is the surplus value of a behavior therapeutic program with motivation enhancing interventions compared to a non-specific counseling (a motivation neutral treatment) with regard to smoking cessation?

- 2. What factors (behavior characteristics, complaints and situational circumstances) are related to motivation to stop smoking and actual smoking cessation among patients with cardiovascular and pulmonary complaints?

In chapter 2 a number of obstacles encountered in the review of smoking cessation intervention studies is considered. A wide variety exists in outcome criteria, which should be taken into account when comparing treatments with regard to effectiveness. Apart from this, the application of methodological procedures with regard to dropout of treatment, missing data and significance testing clearly affect the results of evaluation studies. The effects of the decisions with regard to dropout are illustrated by means of a decision tree. Fifteen studies are considered with regard to decisions about both dropout and missing data. It is concluded that a dropout criterion is a burden rather than a help. The presence at sessions is a more accurate measure and can provide more information about the influence of treatment attrition on treatment effectiveness. Little satisfying remedies exist to handle the problem of missing data, techniques to assure compliance and devoted energy in follow-up being the best to date. Repeated use of significance tests in the evaluation of smoking cessation intervention studies occurs mainly

without attention to the increased risk of a type I error. Conclusions of studies ignoring this increased risk need to be read with caution as they may overestimate the significance of differences in the effectiveness of treatment conditions.
In chapter 3 a literature search provided 64 publications about nicotine chewing gum (NCG). Only 13 studies on the efficacy of NCG were double blind and placebo-controlled. Twelve studies have been reviewed by means of meta-analysis. NCG is used as an adjunct to smoking cessation treatments and is meant to reduce the nicotine related withdrawal symptoms, thereby supposedly increasing the probability of a successful cessation attempt. Differences in effect between active gum and placebo gum were standardized. The validity of the reviewed studies was either low or medium. Adequate reports on the use of the gum were scarce, limiting the validity of the presented results. Users of active gum at first sight appear to be more successful than users of placebo gum. They reported withdrawal symptoms to an equal extent, and experienced more side-effects of the gum. Non-pharmacological variables, like study validity, type of accompanying treatment and the scheduled number of treatment sessions could explain variation in the magnitude of effect differences for success rate, leading to doubts about the contribution of the gum's pharmacological activity in treatment. Differences in success rate (standardized: the effect size) were virtually unrelated to the time lapsed since the start of treatment. It is concluded that no clearly positive picture of the efficacy of nicotine chewing gum emerged, partly due to methodological shortcomings of the studies reviewed.
Chapter 4 reports on the development of the behavior therapy program that constitutes the experimental condition of the smoking cessation intervention study of this book. Two pilot versions have been tested prior to the implementation of the program among patients with cardiovascular and pulmonary complaints. All versions consisted of five weekly sessions of 1,5 hrs. each, with a follow-up session after one month. In the first pilot version participants decreased their smoking stepwise prior to cessation in the fourth session. Contracting, self-regulation (e.g. response substitution), buddy system, covert sensitization, thought stopping, relaxation exercises and relapse prevention constituted the main strategies used in this pilot version. In both the second pilot version and the experimental version coping with not-smoking was emphasized and participants quitted "cold turkey" in the first or second session. In comparison to the first pilot version an

exposure exercise was added, and the themes relaxation and thoughts were treated in separate sessions. In the experimental version the covert sensitization was deleted from the program and replaced by an exercise emphasizing the role of cognitions in emotion in general and craving in particular. In all versions the participants were given home work and written material on the sessions. Although data on the use of the strategies were incomplete, the participants appear to have used response substitution and relaxation exercises most often.

Chapter 5 reports on the design of the smoking cessation intervention study and on short term results of the patients with cardiovascular and pulmonary complaints. The effectiveness of the behavior therapy has been compared to that of a non-specific counseling. Patients living within half an hour travel distance from the hospital were invited to attend a smoking cessation program. Responders were randomly assigned to one of the treatment conditions, within time constraints. The counseling was identical to the behavior therapy in number and duration of sessions. Participants of the counseling program also signed cessation contracts but no further similarities in the program occur. Therapists in this condition focused on group cohesion and reinforced the participants for adequate listening behavior, mutual support, cessation-directed statements and emotional expression. Demographic, medical and smoking variables were measured before treatment. Smoking variables were measured again at the end of treatment and at 4, 13, 26, and 52 weeks follow-up. Ninety nine participants (82 patients and 17 partners) provided data for evaluation. No differences in outcome were found between both conditions. Smoking variables such as daily consumption and nicotine dependence did not explain variance in outcome till 13 weeks follow-up. At the end of treatment and at four weeks follow-up those who were successful had been more often present at sessions than those who were not successful. The former group also more often had smoked low tar-, low nicotine cigarettes. Those more hindered by their bodily complaints were less successful at thirteen weeks follow-up.

The long term results of the cessation intervention study are reported in chapter 6. The success rate curve over time for the two treatment conditions is not significantly different. At 52 weeks follow-up 16 % of the behavior therapy participants report not to have smoked during follow-up, versus 10 % of the non-specific counseling condition. Of those relapsers providing information on their consumption, the consumption at 52 weeks follow-up (46 cigarettes daily, median) was significantly lower than consumption before treatment (138 cigarettes

daily, median). A linear combination of six pretreatment variables predicted smoking status at 52 weeks follow-up for 65 cigarette smoking patients. Compared to smokers, non-smoking patients were characterized before treatment by (in descending order of importance) a low frequency of medication use, a high frequency of wheezing, high displeasure, frequent attendance (note: a therapy variable), a low daily cigarette consumption and high motivation to change smoking behavior. Among relapsers motivation to change smoking behavior had weakened, compared to motivation before treatment. Those smoking relatively little cigarettes named more significant others who never smoked and expressed stronger self-efficacy expectations than those who smoked relatively many cigarettes. Self-efficacy expectations corresponded positively with motivation to change smoking behavior.

In chapter 7 a multifactorial model of smoking cessation is presented. The model considers four independent variables: social pressure, cognitive dissonance, nicotine dependence and beliefs. The dependent variables in the motivation stage are motivation and self-efficacy. The model was tested among bank employees (n = 124). Two methods were applied to test the motivation model: multiple regression analysis and LISREL analysis. Both methods explain little variance in motivation and self-efficacy, yet LISREL analysis allows for distinguishing between direct and indirect effects, thereby outclassing multiple regression. Motivation is directly positively influenced by increases in cognitive dissonance regarding the number of cigarettes smoked and social pressure. Nicotine dependence, beliefs and social pressure influence self-efficacy in a descending order of importance: low nicotine dependence, positive beliefs about not smoking and high social pressure predict high self-efficacy. High self-efficacy expectations lead to high motivation to change. Nicotine dependence and cognitive dissonance covary considerably, resulting in high indirect effects of these variables.
The model tested above was revised and once more tested as reported in chapter 8, with n = 154. Cognitive dissonance was deleted from the model and the number of previous attempts to stop smoking were added as an independent variable. Social pressure was named subjective pressure, taking account of the role of bodily complaints in this variable. Motivation to change was now considered to be operationalized by two indicators: intention to change and wished decrease in the number of cigarettes. The independent variables all influence motivation directly, although the effect of subjective pressure seems mainly indirect. Nico-

tine dependence influences motivation most, with high dependence leading to high motivation to change. A large number of previous attempts, positive beliefs about not smoking and high subjective pressure predict high motivation. Self-efficacy remains relatively untouched by the independent variables and does not appear to influence motivation to change. The incorporation of bodily complaints in the model increases the influence of the concept "subjective pressure". The explanatory power of this model is considerable: 79 % of the variance in motivation is explained, supporting the revision of the model.
A similar model was tested in chapter 9, using data of a sample of outpatients (n=127) with cardiovascular and pulmonary complaints. Because of missing data the influence of self-efficacy could not be assessed. Beliefs were operationalized differently, resulting in two factors: negative beliefs about not smoking and positive beliefs about not smoking. Subjective pressure to stop smoking now largely determined the motivation for behavior change. The less negative one thinks about not smoking, the higher the motivation to change, although this relationship is maintained for theoretical reasons and is not statistically significant. Nicotine dependence was involved only indirectly, as were previous attempts and age. The larger the number of previous attempts, the higher motivation to change. Low nicotine dependence and young age also predict high motivation. Again a substantial proportion of the variance in motivation was explained: 89%.

10.1.2. Summary in Dutch

In hoofdstuk 1 wordt het kader, waarin onderzoek naar stoppen met roken plaatsvindt, geschetst. Algemene kenmerken van roken betreffen farmacologische, psychologische en psycho-sociale factoren. Er wordt vermeld dat de prevalentie en consumptie in Nederland afneemt, respectievelijk stagneert. De schadelijkheid voor de gezondheid, met name wat betreft cardiovasculaire ziekten, CARA en longkanker wordt globaal besproken. Theorieen voor stoppen met roken en interventies worden beknopt behandeld. De introductie besluit met de presentatie van de twee onderzoeksvragen:

- 1. Wat is de meerwaarde van een gedragstherapeutisch programma met motivatieverhogende interventies vergeleken met een non-specifieke counseling (een motivatie-neutrale behandeling) met betrekking tot stoppen met roken?

- 2. Welke factoren (gedragskenmerken, klachten en situationele omstandigheden) zijn gerelateerd aan de motivatie tot en het daadwerkelijk stoppen met roken bij patienten met hart- en long-klachten?

In hoofdstuk 2 bespreken we een aantal obstakels die naar voren komen bij een overzichtstudie naar stoppen met roken interventies. Er bestaat een grote verscheidenheid aan uitkomstcriteria, waarmee rekening moet worden gehouden bij het vergelijken van de effectiviteit van behandelingen. Daarnaast beinvloedt de toepassing van methodologische procedures met betrekking tot dropout uit behandeling, ontbrekende gegevens en significantietoetsen duidelijk de resultaten van evaluatie studies. De effecten van beslissingen met betrekking tot dropout worden geillustreerd met behulp van een beslissingsboom. Vijftien studies worden besproken in verband met beslissingen over zowel dropout als ontbrekende gegevens. We concluderen dat een dropout criterium eerder een last dan een lust is. De aanwezigheid op sessies is een meer accurate maat en kan meer informatie verschaffen over de invloed van toenemende afwezigheid op de effectiviteit van een behandeling. Er bestaan weinig bevredigende remedies tegen het probleem van ontbrekende gegevens, waarbij technieken om compliantie te verhogen en een toegewijde energie bij de follow-up tot nu toe de beste zijn. Het herhaald gebruik van significantietoetsen bij de evaluatie van stoppen met roken-interventiestudies vindt voornamelijk plaats zonder aandacht voor het vergrote risico een type I fout te maken. Conclusies van studies die dit verhoogde risico negeren moeten dan ook behoedzaam gelezen worden, aangezien ze de significantie van het verschil in effectiviteit tussen behandelingscondities kunnen overschatten.
In hoofdstuk 3 leverde een literatuur zoekactie 64 publicaties op over nicotinekauwgom (NKG). Slechts 13 studies over de effectiviteit van NKG waren double blind en placebo-gecontroleerd. Twaalf studies zijn bestudeerd met behulp van meta-analyse. NKG wordt gebruikt als hulpmiddel bij stoppen met roken-behandelingen en is bedoeld om de nicotine-gerelateerde ontwenningsverschijnselen tegen te gaan, waarbij verondersteld wordt dat de kans op een succesvolle stoppoging toeneemt. Verschillen in effect tussen actieve gum en placebogum werden gestandaardiseerd. De validiteit van de samengevatte studies was laag dan wel gemiddeld. Adekwate rapportage over het gumgebruik kwam zelden voor, hetgeen de validiteit van de studies beperkt. Gebruikers van de actieve gum lijken op het eerste gezicht succesvoller dan gebruikers van de

placebogum. Zij rapporteerden in gelijke mate ontwenningsverschijnselen en ervaarden meer bij-effecten van de gum. Nonfarmacologische variabelen als validiteit van de studie, type van de behandeling die er mee gepaard ging en het geplande aantal behandelingssessies konden variatie verklaren in de grootte van effectverschillen met betrekking tot uitkomst, hetgeen tot twijfel leidt omtrent de bijdrage van de farmacologische activiteit van de gum aan de behandeling. Verschillen in succespercentages (gestandaardiseerd: de effect size) waren zo goed als niet gerelateerd aan de tijd die verstreken was sinds het begin van de behandeling. We concluderen dat geen duidelijk positief beeld ontstaat van de effectiviteit van nicotine kauwgom, deels ten gevolge van de de methodologische tekortkomingen van de samengevatte studies.

Hoofdstuk 4 bericht over de ontwikkeling van een gedragstherapeutisch therapie programma dat de experimentele conditie vormt van de stoppen met roken-interventiestudie van dit boek. Twee proefversies zijn getest voorafgaand aan de implementatie van het programma bij patienten met hart- en longklachten. Alle versies bestonden uit vijf wekelijkse zittingen van anderhalf uur elk, met een follow-up zitting na een maand. In de eerste proefversie verminderden de deelnemers hun consumptie stapsgewijs voor het stoppen in de vierde sessie. Contracting, zelfregulatie (bijv. respons substitutie), buddy systeem, coverte sensitisatie, gedachtenstop, ontspanningsoefeningen en terugvalpreventie vormden de voornaamste strategieen die in deze proefversie werden gebruikt. In zowel de tweede proefversie als de experimentele versie werd het omgaan met het niet-roken benadrukt en stopten de deelnemers in een keer ("cold turkey") in de eerste of tweede zitting. In vergelijking met de eerste proefversie werd een exposure-oefening toegevoegd en werden de thema's "ontspanning" en "gedachten" behandeld in aparte sessies. In de experimentele versie werd coverte sensitisatie uit het programma verwijderd en vervangen door een oefening die de rol van cognities benadrukte, bij emoties in het algemeen en bij "craving" in het bijzonder. In alle versies kregen de deelnemers huiswerkopgaven en teksten die betrekking hadden op de sessies. Hoewel de gegevens over de toepassing van de strategieen niet compleet zijn, lijken de deelnemers responssubstitutie en ontspanningsoefeningen het meest te hebben gebruikt.

Hoofdstuk 5 rapporteert over het design van de stoppen met roken-interventiestudie en over de resultaten op korte termijn van patienten met hart- en longklachten. De effectiviteit van de gedragstherapie werd vergeleken met die van non-specifieke counseling. Patienten die binnen

een half uur reizen vanaf het ziekenhuis woonden werden uitgenodigd deel te nemen aan een stoppen met roken-programma. De respondenten werden random ingedeeld in een van de behandelingscondities, binnen tijdslimieten. De counseling was identiek aan de gedragstherapie in aantal en duur van de sessies. Deelnemers aan het counselingsprogramma tekenden ook een contract om te stoppen maar verder waren er geen overeenkomsten in het programma. De therapeuten in deze conditie richtten zich op groepscohesie en bekrachtigden de deelnemers voor adekwaat luistergedrag, wederzijdse steun, stoppen-met-roken-gerichte uitspraken en uiting van emoties. Demografische, medische en rookvariabelen werden gemeten voorafgaand aan de behandeling. Rookvariabelen werden opnieuw gemeten aan het einde van de behandeling en bij follow-up na 4, 13, 26 en 52 weken. Negenennegentig deelnemers (82 patienten en 17 partners) verschaften gegevens voor de evaluatie. Er werd geen verschil in uitkomst tussen beide condities gevonden. Rookvariabelen als dagelijkse consumptie en nicotine-afhankelijkheid verklaarden geen variantie in de uitkomst tot 13 weken follow-up. Aan het eind van de behandeling en bij vier weken follow-up waren de succesvolle deelnemers vaker aanwezig bij de sessies dan de niet-succesvolle. De eerste groep rookte ook vaker sigaretten met een laag teer- en nicotinegehalte. Zij die meer gehinderd werden door lichamelijke klachten waren minder succesvol bij follow-up na 13 weken.
De resultaten van de interventiestudie op lange termijn worden vermeld in hoofdstuk 6. De succesgraadcurve over de tijd gemeten is niet significant verschillend voor beide condities. Bij follow-up na 52 weken meldde 16 % van de deelnemers aan de gedragstherapie gedurende de follow-up niet te hebben gerookt, tegenover 10 % van hen uit de counselingsconditie. Van de terugvallers die informatie verschaften over hun consumptie was de consumptie na 52 weken (46 sigaretten per dag, mediaan) significant lager dan voor de behandeling (138 sigaretten per dag, mediaan). Een lineaire combinatie van zes variabelen voorspelde de rookstatus bij follow-up na 52 weken voor 65 sigarettenrokende patienten. Vergeleken met rokers werden de de niet-rokende patienten voorafgaand aan de behandeling gekenmerkt door (in dalende volgorde van belang) een lage frekwentie van medicijngebruik, een hoge frekwentie van een piepende ademhaling, hoge ontstemdheid, een lage dagelijkse sigaretttenconsumptie en een hoge motivatie om hun gedrag te veranderen. Bovendien waren ze vaak aanwezig bij de sessies. Bij terugvallers was de motivatie om hun rookgedrag te veranderen verslapt, vergeleken met de motivatie voor de behandeling. Die rokers, die relatief weinig

sigaretten rookten, uitten hogere self-efficacyverwachtingen dan zij, die relatief veel sigaretten rookten. De self-efficacyverwachting hing positief samen met de motivatie om het rookgedrag te veranderen.

In hoofdstuk 7 wordt een multifactorieel model van stoppen met roken gepresenteerd. Het model kent vier onafhankelijke variabelen: sociale druk, cognitieve dissonantie, nicotine-afhankelijkheid en beliefs. De afhankelijke variabelen in de motivatiefase zijn motivatie en self-efficacy. Het model is getest bij bankemployees (n=124). Er werden twee methoden toegepast om het motivatiemodel te toetsen: multipele regressie en LISREL analyse. Beide methoden verklaren weinig variantie in motivatie en self-efficacy, maar LISREL maakt onderscheid tussen directe en indirecte effecten mogelijk en overtreft daarmee multipele regressie. Motivatie wordt direct positief beinvloed door door een toename in cognitieve dissonantie met betrekking tot het aantal gerookte sigaretten, en door sociale druk. Nicotine-afhankelijkheid, beliefs en sociale druk beinvloeden self-efficacy in een dalende orde van belangrijkheid: lage nicotine-afhankelijkheid, positieve beliefs over niet-roken en hoge sociale druk voorspellen een hoge self-efficacyverwachting. Een hoge self-efficacyverwachting leidt tot een hoge motivatie tot gedragsverandering. Nicotine-afhankelijkheid en cognitieve dissonantie covarieren aanzienlijk, hetgeen resulteert in hoge indirecte effecten van deze variabelen.
Het hierboven getoetste model is gereviseerd en nogmaals getoetst, zoals vermeld in hoofdstuk 8, met n=154. Cognitieve dissonantie werd verwijderd uit het model en het aantal eerdere stoppogingen werd toegevoegd als een onafhankelijke variabele. Sociale druk wordt benoemd als subjectieve druk, rekening houdend met de rol van lichamelijke klachten in deze variabele. Motivatie om te stoppen met roken wordt nu verondersteld te zijn geoperationaliseerd door twee indicatoren: de intentie tot gedragsverandering en de gewenste afname van het aantal gerookte sigaretten. Alle onafhankelijke variabelen beinvloeden motivatie direct, hoewel het effect van subjectieve druk voornamelijk indirect lijkt. Nicotine-afhankelijkheid beinvloedt motivatie het meest; een hoge afhankelijkheid leidt tot een hoge motivatie tot gedragsverandering. Een groot aantal eerdere stoppogingen, positieve beliefs over niet-roken en hoge subjectieve druk voorspellen een hoge motivatie. Self-efficacy blijft relatief onberoerd door de onafhankelijke variabelen en lijkt de motivatie tot gedragsverandering niet te beinvloeden. De opname van lichamelijke klachten in het model vergroot de invloed van

het concept "subjectieve druk". De verklarende kracht van dit model is aanzienlijk: 79 % van de variantie in motivatie wordt verklaard hetgeen een ondersteuning vormt voor de revisie van het model.
Een soortgelijk model werd getoetst in hoofdstuk 9, gebruik makend van gegevens van een steekproef onder polikliniekpatienten (n=127) met hart- en longklachten. Vanwege ontbrekende gegevens kon de invloed van van self-efficacy niet worden vastgesteld. Beliefs werden op een andere manier geoperationaliseerd, resulterend in twee factoren: negatieve beliefs over niet-roken en positieve beliefs over niet-roken. Subjectieve druk om te stoppen met roken bepaalde nu in hoge mate de motivatie tot gedragsverandering. Hoe minder negatief men denkt over niet-roken, des te hoger de motivatie om te veranderen, hoewel deze relatie om theoretische redenen in het model is gehandhaaft en niet statistisch significant is. Nicotine-afhankelijkheid is slechts indirect betrokken, net als eerdere stoppogingen en leeftijd. Hoe groter het aantal eerdere stoppogingen, des te hoger de motivatie tot gedragsverandering. Lage nicotine-afhankelijkheid en jonge leeftijd voorspellen ook hoge motivatie. Opnieuw werd een aanzienlijk deel van de variantie in motivatie verklaard: 89 %.

10.2. Discussion

10.2.1. The literature

In chapter 2 various pitfalls in the comparison of smoking cessation studies were noted. However, it turned out that the studies reviewed in chapter 3 provided too little information to be completely sure that these pitfalls were prevented. A solution to the problems noted would be the general acceptance of standards for the evaluation of smoking cessation studies, such as developed by the American Cancer Society (1981). Yet such standards are not likely to remain identical over the years, regarding Schwartz's comment on the lack of recommendation for biochemical validation of self-reports (Schwartz, 1987). In general then, the state of the art in smoking cessation research provides the reviewer an opportunity of presenting a "best case analysis" as most journals are inclined to report differences rather than similarities (see Hoogstraten, 1979).

10.2.2. Methodological considerations

Little attention has been payed to the measurement of the constructs that are discussed in the chapters above. Along the lines of Saris & Stronkhorst (1984) we name three important issues in measurement: validity, reliability and measurement level.

As for the first topic, no concern is felt for most measures, except for "the wished decrease in consumption" as a measure of motivation. This measure may be biased because it may reflect self-efficacy expectations. No particularly strong relationship to self-efficacy was found however, which may serve as a comfort in this respect. Nevertheless, more research into this topic is needed to corroborate this conclusion.

As for reliability, the measure used most in classical test theory is Cronbach's alpha (Cronbach, 1958), yet other measures are in use as well (e.g. Guttman's lambda, the split-half coefficient, Kuder-Richardson, cf. Nie et al., 1975). In this study Cronbach's alpha was used, it being a conservative estimate of reliability. This may have consequences for LISREL analysis, which will be discussed below. Recent developments in test theory are seen in latent trait theory, especially the Rasch model (Rasch, 1980). This model is characterized by two parameters, a subject parameter and an item parameter. Latent trait theory allows more parameters but they mostly lead to problems in the estimation (Fisher, 1974). The Rasch model does not assume a linear relationship between error of measurement, reliability and true score (it is a probabilistic model) but considers the items of a scale to be stochastic variables that covary within a subject due to the latent construct (cf. "true score" in classical test theory). The most important feature of this model is the so-called "specific objectivity". Items of a scale can be compared on a dimension independent of the subjects; as well as e.g. the skill of subjects can be compared independent of the items that measured it.

Another major advantage of this model is the option to test for unidimensionality (van den Wollenberg, 1979). Cronbach's alpha is often considered to be an indicator of unidimensionality, yet several dimensions may be hidden in a scale with an apparently satisfying reliability. An interesting line of further investigation would be the application of the Rasch model to e.g. the measure of motivation: is it actually a unidimensional construct, and how do the various items relate to each other? Note however, that the fitting of this model has been described as "a heady tale" (Wood, 1978), possibly due to its rigorous formal assumptions.

The last measurement topic concerns the level of measurement. Only a few measures are clearly measured at the ratio level (e.g. the number of previous attempts). Most variables are measured at the ordinal level, with some treated as if measured at the interval level (e.g. self-efficacy, beliefs about smoking).

A recurring problem in the analyses of the various chapters is the occurrence of missing data. Particularly the self-efficacy questionnaire is plagued by this problem, which has even led to the deletion of this variable in chapter 9. Therefore one should be cautious in drawing conclusions. In spite of the fact that the results as a whole are in accordance with current insights about smoking cessation, replication is needed before the various presented relationships can be taken for granted in larger populations.

Before interpreting the results of the chapters concerning a multifactorial model for motivation we would like to point once more to the specific advantages of LISREL in the analysis of structural equations. Various other multivariate techniques exist that can handle more than one dependent variable (e.g. canonical correlation analysis, see chapter 6).

Path analysis has also been used to describe linear relationships, whereas confirmatory factor analysis also estimates loadings of latent constructs. Yet these techniques either lack the distinction between observed and latent variables or can be considered as a special case of LISREL.

We have to consider the variability in the estimates of the various relationships. Taking into account the study of Boomsma (1983), sampling variance can be discarded as a possible cause, the number of subjects in our study being >100. Several reasons can be given for the variability. First, none of the models is totally identical, with differences in operationalizations possibly leading to differences in the estimates. Yet this does not explain the variability in the estimates concerning the influence of subjective pressure on motivation, a concept which remains identical over studies. However, LISREL uses a full information maximum likelihood technique, which means that the relationships are estimated taking into account all variables of the model at the same time. Thus, estimated effects of identical concepts may vary depending on the variables they are estimated with.

Another reason can be that the reliability of the used measures is rather low, allowing for variability in the variance-covariance matrices when applied to various samples.

Thirdly, the model was tested in two populations, differing in age and life circumstances. The structure of correspondences within the model therefore may differ considerably between the samples. Social desirability may have influenced the responses given by the patients. The strong influence of subjective pressure on motivation suggests such a hypothesis, yet without knowledge about self-efficacy expectations this may be a premature conclusion.
Therefore, it must be concluded that the provided figures should be considered as indicators of relationships and should not be interpreted too strictly with regard to their magnitude.
After considering these general issues we turn to the topic of measurement in LISREL analysis. As noted before we entered the reliability to solve problems in the identification of the model, which is a normal procedure (Joreskog & Sorbom, 1978). It should be noted here that the conservative character of Cronbach's alpha may lead to underestimation of the structural parameters, the actual influence of the various concepts may be stronger.
The level of measurement influences LISREL analysis because several measures are of an ordinal level. Boomsma (1984) tackled this issue and found that LISREL is robust against categorization of the observed variables. However, it is not robust for skew distributions, for which has been controlled in the current study: the scale values were adjusted so that the normal distribution was approximated (see also Saris & Stronkhorst). We therefore have confidence in the robustness of the results found.
A last remark concerns the procedure followed in the estimation, which may be confusing to the reader. LISREL has been used merely in an explorative way, without any pretention to specify a predetermined structure. If we would have worked the other way round, by respecifying a model from the residuals matrix, the results could have had little to do with the model that produced the data (Costner & Schoenberg, 1973).

10.2.3. Therapy evaluation: determinants of cessation and maintenance

Chapter 3 shows that nicotine chewing gum appears to be of little value, if any, when compared to placebo gum. Regarding the substantial body of evidence with regard to the important role of nicotine in smoking this is a sobering result, casting doubt at the importance of physiological dependence in the maintenance of smoking cessation. On the other hand, too little is known to date about the effect of the

dispension schedule of the gum. The chewing of gum whenever one feels in need of a cigarette may be inadequate to mimic the nicotine levels achieved by smoking cigarettes to an extent that prevents smoking. Yet again, labeling of physiological states and expectancy of effect of smoking may be more important variables in cessation than the mere presence or absence of nicotine. This line of reasoning deserves further development in future studies. It seems to be clear however, that nicotine's influence will be short term anyway, as many smokers relapse in the absence of withdrawal symptoms, after an extended period of abstinence and in the presence of others (Shiffman, 1982). Even in the absence of the above mentioned factors, the situational stimulus configuration may elicit smoking behavior due to learning history. A complete relapse to smoking may then be understood by the Abstinence Violation Effect as postulated by Marlatt & Gordon (1980). Cultural norms and values also appear to determine smoking behavior (Hadaway, Beyerstein & Kimball, 1986), which is reflected by the effect of social support (Colletti & Brownell, 1982) on the maintenance of cessation. Regarding the suggested role of subjective pressure in the motivation to change smoking behavior, psychological and psycho-social factors may affect both the impact of physiological states and the refraining from previously experienced effects of smoking. These facts should disappoint any researcher looking for a pharmacological panacee for smoking cessation. It should come as no surprise then that the comparison of the behavior therapy to a nonspecific counseling has been designed without incorporating nicotine chewing gum in either of the treatments.

Previous studies comparing behavior therapy to other types of therapy found no differences in effect. We postulated that these results may have been caused by selection factors, such as screenings, waiting lists and financial costs. The results indicate that selection factors should not be held responsible for the lack of differences in effectiveness: the treatment conditions were equally effective. Possibly the low threshold for participation has influenced the success rate of the study, in so far that the overall success rates of both conditions have been modest since the end of treatment. Another explanation for the latter is that five weekly sessions are too little and of a too short duration to be able to lead to maintained behavior change. However, the fact that relapsers apparently do reduce their consumption despite their failure to quit is an argument in favor of low participation thresholds. This holds especially for patients with cardiovascular and pulmonary complaints.

Motivation is considered to be a predictor of success in various behavior change models. This hypothesis is confirmed in chapter 6, as well as the empirical fact that motivation does not predict behavior perfectly. Among the patients medical variables as a low frequency of medication use and a wheezing respiration appear to be more important predictors. Combining this result with the lower short term success rate of smokers who are often troubled by complaints, the effect of motivation on cessation apparently is limited by situational quality of life factors. This might have been reflected by self-efficacy expectations, which could not be analysed in the prediction study. On the other hand one should note that this concerns motivation to change before treatment has started. Motivation during treatment also is an important variable (Brengelmann, 1978; Glasgow, Schafer & O'Neill, 1981), a result that was replicated, if the attendance at sessions is considered as an indicator of motivation.

Looking at the importance of a wheezing respiration in cessation and the importance of subjective pressure in motivation to change, we would suggest two mechanisms. The first is that the experience of complaints contributes to changing or intending to change. Wheezing is such a complaint that can hardly be overlooked or attributed to temporary factors, like with coughing. As many smokers suffer from a hightened airway resistance or have to cough in the morning, it may be a good intervention strategy to have smokers observe their smoking related bodily inconveniences.

The second mechanism that may be at work here is social pressure. This concept in itself proved to influence motivation, and may explain why especially a wheezing repiration predicts smoking status after 52 weeks. Wheezing is considered to be an indicator of bad health, and smokers may experience corresponding reactions from others like worrying, disapproving of smoking or stimulating them to stop. As this complaint did not discriminate successes from failures at short term, this hypothesis assumes a combined effect of pressure before and support after cessation. Yet, it is stressed once more that wheezing may have emerged as an important predictor because of missing data in other medical variables.

10.2.4. The motivation to change smoking behavior

The motivation model discussed in the current study describes some determinants of contemplation to change and should be extended to the subsequent stages of cessation, among larger samples of smokers. Ne-

vertheless, the results of chapters 7, 8 and 9 seem to point into one direction with regard to the role of subjective pressure in motivation. Although its estimates in the three studies vary to a certain extent, it can be concluded that high subjective pressure leads to high motivation to change.

The role of nicotine dependence in motivation is less clear cut. To date no studies exist that assess the role of nicotine dependence in the stage of contemplation to change, so we will have to interpret the results concerning nicotine in the light of actual cessation. Lehrer (1978) supposed that high social pressure makes addicted smokers visit a cessation clinic. This line of reasoning is in accordance with the importance of both subjective pressure and nicotine dependence in motivation. Another interesting view is posed by McKennell & Thomas (1967), who introduced the "dissonant smoker". Criticism has been raised against this concept (Eiser, 1982), it being defined by affirmation of the question: "Would you like to stop smoking altogether if you could do so easily?" Eiser argued that because of the affix "if you could do so easily" no real dissonance occurs for those who feel they can **not** stop easily.

The triangle "nicotine dependence - self-efficacy - motivation" as described in the optimal model of chapter 9 shows resemblance to the mechanism supposedly active in the "dissonant smoker": Those high in nicotine dependence are motivated to stop, yet estimate their efficacy to be low. This result argues in favor of the concept "dissonant smoker", even when taking Eiser's criticism into account. Therefore, notwithstanding that two of the three chapters indicate that nicotine dependence plays only a secondary role, we opt for the result of chapter 8 as the most plausible structure between variables associated with motivation to change smoking behavior.

Future developments of motivational theories will have to take into account the influence of subjective estimates of one's own control, efficacy, success expectations and other concepts referring to expectations of future behavior. The mechanism referred to seems rather robust with various operationalizations leading to similar results. Recently the Reasoned Action Model has been successfully extended with the perception of behavior control (Ajzen & Madden, 1986). However, until now no cessation studies have reported a systematical, theoretically founded attempt to influence this concept. Although an attempt has been made in the current study to investigate determinants of self-efficacy, only subjective pressure and nicotine dependence influenced

self-efficacy to a minor extent. Further studies may investigate the correspondences of self-efficacy with social support and coping strategies in the action and maintenance stages of cessation in detail, as they have proven to be associated with maintained abstinence (Lichtenstein, Glasgow & Abrams, 1986; Killen, Maccoby & Taylor, 1984).

10.2.5. Prospects

In order to be better able to understand the status of smoking behavior in the Netherlands it is useful to consider the following facts:

-Smoking is (still) normative, special signs indicate where such is prohibited (public lavatories signs are an example of the opposite).
-Cigarettes can be purchased in supermarkets, restaurants, cinemas, gasoline stations, snack bars, auto vendors, and public services providing the forementioned facilities: public transport stations, shopping centres, sports facilities, and hospitals.
-Cigarette advertisements stimulate smoking in cinemas, sporting events, family magazines and on public bill boards.
-Recently the tobacco industries in the Netherlands have launched a campaign to influence the social norm about smoking.

It is this social environment that is permissive towards smoking in which smoking cessation attempts take place. Yet the importance of these environmental factors has hardly been evaluated in cessation studies, as they go beyond the personal level of intervention attempted by most treatment programs. Applied social research can help where other disciplines fall short, relating these hitherto neglected factors to smoking (cessation) behavior. For the Dutch situation, clinics for smoking cessation are not seen yet as a preferable way to quit, as most smokers wish to quit on their own. Therefore, further developments in smoking cessation theory will have to give attention to those smokers who do not wish to attend a smoking cessation clinic. Some innovative research has been done by DiClemente, Prochaska & Gibertini (1985), yet these authors have limited their attention mainly to coping behaviors of the subjects. Apart from this, more details are needed on the influence of nicotine dependence, self-efficacy expectations, social networks and support regarding smoking and cessation in self-quitters.

It should be clear that the choice for research among self-quitters is based partly on medical, partly on economical arguments. Smoking has been found to be the primary preventable cause of death in the western society and therefore should be attacked as forcefully as possible from a medical point of view. Here economics turn up, demanding an effi-

cient use of society's financial resources. More knowledge about the processes involved in smoking cessation in self-quitters allows for more cost-effective large scale interventions and thus for better public health.

Current smoking research developments in the Netherlands besides this study are mainly restricted to prevention of smoking in adolescents (Kok & de Vries, 1987; Chatrou, 1987). However, these are all rather small scale projects. If results permit, prevention should be implemented nation wide in order to obtain the goals of the Government's policy paper "Nota 2000". This paper proposes the development of a policy that decreases the smokers prevalence by the year 2000 to 20%. Another measure to achieve the goals of the paper appears to be the implementation of large scale interventions making use of peer leaders promoting cessation. The results of the current study support this approach. Particularly because recent research has shown that in the Netherlands more physicians and nurses smoke than the average population (Adriaanse, van Reek & Metsemakers, 1986, Adriaanse, van Reek & Evers, 1986), increased cessation rates in these professions can have substantial influence on cessation rates in the population. A proposal for an innovative project directed at physicians has been made by Boekema (1987). Making use of previous Dutch large scale smoking cessation studies (Kok, Matroos, vd Ban & Hautvast, 1982; Marsman & Peters, 1979), careful assessment of the various stages of cessation can increase the cost-effectiveness of such future community interventions.

With regard to research, smoking cessation clinics are a necessity though they can only serve to help those smokers that cannot or do not wish to stop on their own. However, most treatments are of the broad-spectrum type and they can hardly be expected to provide the answer to the question "how does cessation work?". As the main purpose of most treatments is to have the participants quit (in accordance with the above mentioned cost-effectiveness for health gain) they focus on, i.e. isolate, smoking behavior.

Taking a more theoretically oriented point of view, regarding smoking as an addictive behavior, other research options come to mind. Smoking cessation literature until now has given little attention to functionally related problem behaviors. Only a minority of publications provide case studies that tell into detail how and why a particular quitter failed or succeeded. Collins & Marlatt (1983) showed that smoking may be embedded in a life style, which is able to prevent successful cessation. More N=1 design studies can reveil functional determinants of failure

and success in smoking cessation that may go beyond the current intervention paradigms of aversion therapy and self-regulation.

Taking into account the intensified efforts of the Dutch Government to cut back smoking prevalence, a hightened demand for therapeutic help may be expected in the near future. Individual smoking cessation therapy may then benefit from the suggested research developments. There is no reason why those unable to quit smoking by themselves should not receive the same quality of therapeutic care as given to those suffering from hyperventilation, chronic pain or, more similar, alcohol and illicit drug abuse. However, till date the Dutch social security companies do not refund costs for smoking cessation therapy, thereby neglecting the gain in physical and mental health that may be achieved.

Although the medical status of the Dutch population can be ameliorated by psychological interventions, both are to a certain extent dependent on political decisions. In the light of current events (e.g. the law on the prohibition of smoking in public places) political decisions may turn out to be critical determinants of smoking cessation at the societal level that still await evaluation.

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ACADEMISCH ZIEKENHUIS UTRECHT

Schriftelijke enquete voor rokers, ex-rokers en niet-rokers

Deze vragenlijst is bedoeld voor patienten van de afdelingen cardiologie en longziekten van het Academisch Ziekenhuis Utrecht Wij hopen zo inzicht te krijgen in de relatie van roken met uw gezondheidstoestand. Wilt u de antwoorden aangeven door het desbetreffende hokje achter de vragen met potlood zwart te maken?
Er bestaan geen foute antwoorden, geeft u uw eigen indruk Staat u alstublieft geen enkele uitspraak over.

ALGEMENE VRAGEN

1 Streep aan in welke kategorie uw leeftijd valt
- 15 t/m 19 jaar
- 20 t/m 24 jaar
- 25 t/m 29 jaar
- 30 t/m 34 jaar
- 35 t/m 39 jaar
- 40 t/m 44 jaar
- 45 t/m 49 jaar
- 50 t/m 54 jaar
- 55 t/m 59 jaar
- 60 t/m 64 jaar
- 65 t/m 74 jaar
- 75 jaar en ouder

2 Wat is uw geslacht?
- man
- vrouw

3 Hoeveel kinderen heeft u?
- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7 of meer

4 Wat is uw woonsituatie?
- alleenwonend
- gehuwd of samenwonend
- anders

5 Welke opleiding heeft u voltooid?
- lager onderwijs
- lager beroepsonderwijs
- (M)ULO MAVO
- middelb beroepsonderwijs
- MMS HAVO
- HBS VWO, gymnasium
- hoger beroepsonderwijs
- universiteit
- andere opleidingen

Deze formulieren kunnen machinaal worden verwerkt

Wilt u daarom bij het invullen de volgende regels in acht nemen

- gebruik een potlood, eventuele vergissingen volledig weggummen
- vul het vakje dat van toepassing is geheel op, maar kom niet buiten de lijntjes
- houd de formulieren schoon
- nadat u de vragenlijst volledig hebt ingevuld kunt u de laatste pagina losscheuren langs de perforatierand dubbelvouwen op de vouwperforatie en in de bijgevoegde enveloppe terugzenden
- de eerste pagina's kunt u behouden

niet zo: ~~zo~~ ~~óó~~ maar zo: ✓

6 Bent u
- huisvrouw ☐
- betaald werkzaam ☐
- student ☐
- gepensioneerd/VUT ☐
- werkeloos ☐
- arbeidsongeschikt ☐

7 Mogelijk moet u dagelijks medicijnen innemen
Dit betekent meestal dat u één of meerdere medicijnen tegelijk inneemt
Wanneer doet u dit? (meerdere antwoorden mogelijk)
- 's morgens ☐
- 's middags ☐
- 's avonds ☐
- vaker ☐
- n v t ☐

8 Bent u een
- niet-roker? (nooit gerookt) ☐
- ex-roker? (vroeger gerookt) ☐
- roker? ☐

KLACHTENLIJST

1 Voor welke onderstaande klachten was u het afgelopen jaar onder medische behandeling? (meerdere antwoorden mogelijk)
- hart- en vaatziekten ☐
- hoofdpijn ☐
- gewrichtsklachten ☐
- hoge bloeddruk ☐
- maagklachten ☐
- kanker ☐
- suikerziekte ☐
- cara (bronchitis emfyseem asthma) ☐
- reuma ☐
- rugklachten ☐
- huidziekten ☐

Klachtenlijst (vervolg) 2

Wilt u bij onderstaande vragen aangeven hoe vaak ze bij u van toepassing zijn?

		zelden of nooit	soms	vaak	zeer vaak of altijd
2 Bent u weleens kortademig	wanneer u een lichte helling of trap oploopt	☐	☐	☐	☐
	wanneer u in normaal tempo op vlak terrein loopt	☐	☐	☐	☐
	na wassen of aankleden	☐	☐	☐	☐
	in rust zittend of liggend	☐	☐	☐	☐
3 Heeft u een beklemmend stekend zeurend of pijnlijk gevoel op de borst bij	lichte inspanning	☐	☐	☐	☐
	emotionele opwinding	☐	☐	☐	☐
	zware inspanning	☐	☐	☐	☐
	's nachts	☐	☐	☐	☐
	overgang van warmte naar koude	☐	☐	☐	☐
	rust, zonder aanleiding	☐	☐	☐	☐
4 Heeft u hartkloppingen overslag van het hart bij	lichte inspanning	☐	☐	☐	☐
	emotionele opwinding	☐	☐	☐	☐
	zware inspanning	☐	☐	☐	☐
	's nachts	☐	☐	☐	☐
	overgang van warmte naar koude	☐	☐	☐	☐
	rust zonder aanleiding	☐	☐	☐	☐
5 Heeft u last van	duizeligheid	☐	☐	☐	☐
	flauwvallen	☐	☐	☐	☐
	tintelingen in handen of voeten	☐	☐	☐	☐
	zweten	☐	☐	☐	☐
	dikke enkels of voeten	☐	☐	☐	☐
	moeilijk uw aandacht ergens bij kunnen houden	☐	☐	☐	☐
	moeheid	☐	☐	☐	☐
	pijn in benen bij het lopen	☐	☐	☐	☐
	piepende ademhaling	☐	☐	☐	☐
	perioden van benauwdheid	☐	☐	☐	☐
	hoesten	☐	☐	☐	☐
	slijm (sputum) opgeven	☐	☐	☐	☐
	groen-geel sputum gecombineerd met hoesten koorts benauwdheid	☐	☐	☐	☐
6 Hoe vaak hinderen uw klachten u bij de uitvoering van uw normale bezigheden?		☐	☐	☐	☐

7 Hoe vaak stopt u met uw normale bezigheden vanwege uw klachten?							
8 Hoe vaak verdwijnen de klachten	spontaan zonder er verder op te letten						
	spontaan in rust						
	na medicijngebruik						
		nooit	1 keer	2 keer	3 en meer		
9 Hoe vaak bent u opgenomen geweest voor	asthma						
	een luchtweginfectie						
	longkanker						
	andere longklachten						
	een hartoperatie						
	een hartinfarct						
	andere hart en vaatklachten						
	andere klachten						
		nooit	1 2 keer	3 4 keer	5 en meer		
10 Hoe vaak heeft u het afgelopen jaar uw huisarts bezocht in verband met	hart- en vaatklachten						
	longklachten						
	andere klachten						
11 Hoe vaak heeft u het afgelopen jaar een specialist bezocht in verband met	hart- en vaatklachten						
	longklachten						
	andere klachten						

ROKERS GA VERDER OP BLADZIJDE 4 (VRAGENLIJST VOOR ROKERS)
NIET-ROKERS GA VERDER OP BLADZIJDE 6 (UITSPRAKENLIJST)

VRAGENLIJST VOOR EX ROKERS

1 Hoeveel sigaren rookte u gemiddeld per dag?	0						
	1						
	2						
	3						
	4 5						
	6 10						
	11 of meer						

| | | |

7	Vond u het moeilijk om niet te roken op plaatsen waar het verboden is bijv in de bioscoop?	ja nee							
8	Welke sigaret kon u het moeilijkst opgeven?	de eerste s ochtends	nooit	1 keer	2 keer	3 en meer			
		bij de koffie							
		de laatste s avonds							
		een andere							
		n v t							
9	Rookte u s ochtends meer dan gedurende de rest van de dag?	ja							
		nee							
10	Rookte u wanneer u ziek te bed lag?	ja							
		nee							
11	Hoeveel nicotine bevatte uw favoriete merk? (staat op het pakje tegenwoordig)	0 9 mg of minder	nooit	1 2 keer	3 4 keer	5 e meer			
		1-1 3 mg							
		meer dan 1 3 mg							
		weet het niet							
12	Wie of wat spoorde u aan te stoppen met roken?	partner							
	(meerdere antwoorden mogelijk)	familieleden							
		(huis)arts							
		vrienden							
		collega s							
		anti rook reklame							
		lichamelijke klachten							
13	Hoe vaak heeft u eerder geprobeerd te stoppen?	nooit							
		1 keer							
		2 keer							
		3 keer							
		4 keer							
		5 keer of vaker							

14 Van welke hulpmiddelen of methoden heeft u gebruik gemaakt bij het stoppen? (meerdere antwoorden mogelijk)
- niet-roken kursus
- groepstherapie
- nicotine kauwgum
- akupunktuur
- andere hulpmiddelen of methoden
- geen hulpmiddelen of methoden

15 Wanneer bent u gestopt met roken?
- in de laatste maand
- 1-3 maanden geleden
- 4-6 maanden geleden
- 7-11 maanden geleden
- 1 tot 2 jaar geleden
- 3 jaar of langer geleden

16 Hoeveel mensen kent u in uw omgeving die al langer dan een jaar gestopt zijn met roken?
- geen
- 1-2
- 3-4
- 5-6
- 7 of meer

17 Heeft u de indruk dat uw klachten samenhingen met uw roken?
- ja
- nee

18 Heeft u de indruk dat uw klachten zijn verminderd sinds u gestopt bent met roken?
- ja
- nee

EX ROKERS GA VERDER OP BLADZIJDE 6 (UITSPRAKENLIJST)

VRAGENLIJST VOOR ROKERS

1 Hoeveel sigaren rookt u gemiddeld per dag?
- 0
- 1
- 2
- 3
- 4 5
- 6-10
- 11 of meer

2 Hoe vaak steekt u per dag een pijp op?
- nooit
- zelden of nooit
- soms
- vaak
- zeer vaak of altijd

	1 keer	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	2 keer	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	3 keer	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	4 5 keer	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	6-10 keer	☐	☐	nooit	1 keer	2 keer	3 en meer	☐	☐	☐	■
	11 keer of vaker	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
3 Hoeveel sigaretten (gekocht of zelfgerold) rookt u **totaal** per dag?	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	1 of 2	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	3 t/m 7	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	8 t/m 12	☐	☐	☐	☐	☐	☐	☐			■
	13 t/m 17	☐	☐	☐	☐	☐	☐	☐			■
	18 t/m 22	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	23 t/m 27	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	28 t/m 34	☐	☐	nooit	1 2 keer	3 4 keer	5 en meer	☐	☐	☐	■
	35 t/m 44	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	45 t/m 54	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	55 t/m 64	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	65 t/m 74	☐	☐	☐	☐	☐	☐	☐	☐	☐	■
	75 of meer	☐	☐	☐	☐	☐	☐	☐			■
4 Inhaleert u bij het sigaretten roken?	n v t	☐	☐	☐	☐	☐	☐	☐			■
	nee	☐	☐								■
	soms	☐	☐							☐	■
	ja	☐	☐							☐	■
5 Rookt u meestal	teer en nicotine arme sigaretten **met** filter?	☐	☐							☐	■
	andere sigaretten **met** filter?	☐	☐	☐						☐	■
	sigaretten **zonder** filter?	☐	☐	☐						☐	■
	n v t	☐	☐	☐						☐	■
6 Hoe snel steekt u na het wakker worden een sigaret op?	na 0-15 minuten	☐	☐	☐						☐	■
	na 15-30 minuten	☐	☐	☐						☐	■
	na 30-60 minuten	☐	☐	☐						☐	■
	meer dan 60 minuten	☐		☐						☐	■
	n v t	☐								☐	■

| | | |

	andere hulpmiddelen of methoden	☐	☐	☐	☐	☐	☐	☐	☐	☐
	geen hulpmiddelen of methoden	☐	☐	☐	☐	☐	☐	☐	☐	☐
15 Wanneer probeerde u voor het laatst te stoppen met roken?	n v t	☐	☐	☐	☐	☐	☐	☐	☐	☐
	in de laatste maand	☐	☐	☐	nooit	1 keer	2 keer	3 en meer	☐	☐
	1-3 maanden geleden	☐	☐	☐	☐	☐	☐	☐	☐	☐
	4-6 maanden geleden	☐	☐	☐	☐	☐	☐	☐	☐	☐
	7-11 maanden geleden	☐	☐	☐	☐	☐	☐	☐	☐	☐
	1 tot 2 jaar geleden	☐	☐	☐	☐	☐	☐	☐	☐	☐
	3 jaar of langer geleden	☐	☐	☐	☐	☐	☐	☐		☐
16 Welke uitspraak is voor u van toepassing?	ik wil altijd blijven roken zoals ik nu rook	☐	☐	☐	☐	☐	☐	☐		☐
(meerdere antwoorden mogelijk)	ik twijfel of ik wil minderen	☐	☐	☐	☐	☐	☐	☐	☐	☐
	ik wil minderen	☐	☐	☐	☐	☐	☐	☐	☐	☐
	ik twijfel of ik wil stoppen	☐	☐	☐	nooit	1 2 keer	3 4 keer	5 en meer	☐	☐
	ik wil stoppen met roken	☐	☐	☐	☐	☐	☐	☐	☐	☐
	ik wil dit jaar stoppen met roken	☐	☐	☐	☐	☐	☐	☐	☐	☐
	ik wil binnen 3 maanden stoppen met roken	☐	☐	☐	☐	☐	☐	☐	☐	☐
	ik wil deze week stoppen met roken	☐	☐	☐	☐	☐	☐	☐	☐	☐
	ik wil vandaag stoppen met roken	☐	☐	☐	☐	☐	☐	☐	☐	☐
17 Hoeveel mensen kent u in uw omgeving die al langer dan een jaar gestopt zijn met roken?	geen	☐	☐	☐	☐	☐	☐	☐		☐
	1-2	☐	☐	☐						☐
	3-4	☐	☐	☐					☐	☐
	5-6	☐	☐	☐					☐	☐
	7 of meer	☐	☐	☐					☐	☐
18 Wilt u aangeven welke tabaksartikelen u ooit langer dan een jaar heeft gerookt?	sigaretten	☐	☐	☐	☐				☐	☐
(Mogelijk heeft u uw rookgewoonten veranderd)	shag	☐	☐	☐	☐				☐	☐
	sigaren	☐	☐	☐	☐				☐	☐
	pijp	☐	☐	☐	☐				☐	☐
19 Heeft u de indruk dat uw klachten samenhangen met uw roken?	ja	☐	☐	☐	☐				☐	☐
	nee	☐	☐	☐	☐				☐	☐
20 Heeft u de indruk dat uw klachten zullen verminderen wanneer u stopt met roken?	ja	☐	☐		☐				☐	☐
	nee	☐	☐						☐	☐

21 Hoeveel sigaretten zou u mogen roken van uzelf als u kon kiezen?

0	☐
1 of 2	☐
3 t/m 7	☐
8 t/m 12	☐
13 t/m 17	☐
18 t/m 22	☐
23 t/m 27	☐
28 t/m 34	☐
35 t/m 44	☐
45 t/m 54	☐
55 t/m 64	☐
65 t/m 74	☐
75 of meer	☐

VERWACHTINGSLIJST Geef van onderstaande handelingen aan in welke mate **u verwacht deze nu te kunnen uitvoeren** Ook wanneer u niet wilt stoppen met roken kunt u alle vragen invullen

			zeer onzeker	onzeker	zeker	zeer zeker
In gezelschap van huisgenoten of bekenden	1	kan ik er op letten hoeveel ik rook	☐	☐	☐	☐
	2	kan ik minder roken dan voorheen	☐	☐	☐	☐
	3	kan ik niet roken	☐	☐	☐	☐
	4	kan ik het standpunt om niet te roken uitdragen	☐	☐	☐	☐
Als ik alleen ben	5	kan ik er op letten hoeveel ik rook	☐	☐	☐	☐
	6	kan ik minder roken dan voorheen	☐	☐	☐	☐
	7	kan ik niet roken	☐	☐	☐	☐
	8	kan ik mijzelf herinneren aan mijn standpunt om niet te roken	☐	☐	☐	☐
Wanneer ik een sterke behoefte aan roken heb	9	kan ik er op letten hoeveel ik rook	☐	☐	☐	☐
	10	kan ik minder roken dan voorheen	☐	☐	☐	☐
	11	kan ik niet roken	☐	☐	☐	☐
	12	kan ik het standpunt om niet te roken uitdragen	☐	☐	☐	☐
Als ik kwaad verdrietig of gespannen ben	13	kan ik er op letten hoeveel ik rook	☐	☐	☐	☐
	14	kan ik minder roken dan voorheen	☐	☐	☐	☐
	15	kan ik niet roken	☐	☐	☐	☐
	16	kan ik het standpunt om niet te roken uitdragen	☐	☐	☐	☐

0 1 2 3 4 5 6 7 8 9

zelden of nooit | soms | vaak | zeer vaak of altijd

Als ik vrolijk gelukkig of tevreden ben

17 kan ik er op letten hoeveel ik rook
18 kan ik minder roken dan voorheen
19 kan ik niet roken
20 kan ik het standpunt om niet te roken uitdragen

nooit | 1 keer | 2 keer | 3 en meer

UITSPRAKENLIJST Wilt u aangeven in hoeverre u het eens bent met de onderstaande uitspraken
In sommige uitspraken worden rokers en niet-rokers vergeleken

oneens | beetje oneens | beetje eens | eens

1 Niet-roken is sociaal
2 Niet-rokers proeven meer
3 Rokers kunnen zich moeilijker ontspannen
4 Niet-roken veroorzaakt overwicht
5 Roken is een goede tijdsbesteding bij verveling
6 Niet roken belemmert ontspanning
7 Niet-rokers zien minder waar hun geld blijft
8 Niet rokers hebben meer moeite met sociale kontakten dan rokers
9 Roken is relatief goedkoop
10 Roken vermindert het reukvermogen
11 Roken is genieten
12 Niet-rokers zijn rustiger
13 Rokers worden moeilijker geaccepteerd
14 Niet-roken vermindert de kans op longkanker
15 Niet-rokers genieten minder
16 Niet-rokers houden meer geld over
17 Roken geeft zelfvertrouwen
18 Niet-rokers kunnen spanning minder goed aan
19 Roken vergemakkelijkt het omgaan met anderen
20 Roken is geldverspilling
21 Roken verhoogt de kans op een hartinfarct
22 Roken verergert nervositeit
23 Niet-rokers voelen zich zekerder
24 Roken vermindert de kans op een maagzweer

nooit | 1 2 keer | 3 4 keer | 5 en meer

Het is de bedoeling dat u het antwoord aanstreept dat de LAATSTE TIJD op u van toepassing is. Wanneer u een uitspraak beslist niet met "juist" of "onjuist" kunt beantwoorden, dan streept u het vakje onder "?" aan

		juist	?	onjuist								zelden of nooit	soms	vaak	zeer vaak of altijd	
1	Ik heb nogal eens vage maagklachten	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
2	De laatste tijd voel ik me op m'n gemak	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
3	Als het buiten koud en winderig is, kom ik het huis haast niet uit	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
4	Soms ben ik zo onrustig, dat ik niet stil kan blijven zitten	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
5	Ik vermijd drukke straten	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
6	Als ik veel mensen ga ontmoeten, word ik zenuwachtig	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
7	Ik voel me de laatste tijd fit	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
8	Ik vind het vervelend een groep onbekende mensen toe te spreken	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
9.	Vroeger kon ik veel meer werk verzetten	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
10	Ik maak me de laatste tijd zorgen over de kans op (weer) een hartaanval	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
11	Ik ben gauw geprikkeld	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
12	Ik vind mijn uithoudingsvermogen te gering	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
13.	De laatste tijd maak ik mij over de toekomst zorgen	☐	☐	☐	☐				☐	☐	☐	☐	☐	☐	☐	☐
14.	De laatste tijd voel ik me blij	☐	☐	☐					☐	☐	☐	☐	☐	☐	☐	☐
15	Ik vind het nogal vervelend, dat ik tegenwoordig de tranen meer de vrije loop laat	☐	☐	☐	zeer onzeker ☐	onzeker ☐	zeker ☐	zeer zeker ☐	☐	☐	☐	☐	☐	☐	☐	☐
16	Vroeger was ik heel wat meer waard	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17	Ik werk liever alleen dan met een aantal mensen samen	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18	In een groep heb ik meestal de leiding	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
19.	Ik voel mij gezond	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20.	Ik voel me gauwer moe dan ik normaal vind	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21	Ik heb het nogal eens benauwd op de borst	☐	☐	☐	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐
22	Ik maak me nogal eens zorgen dat ik er financieel op achteruit zal gaan	☐	☐	☐	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐
23	Ik voel me meestal opgewekt	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24	De laatste tijd voel ik mij rustig	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25	Ik hou ervan opdrachten te geven	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26	Tot nu toe is me bijna alles gelukt wat ik wilde	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
27	De laatste tijd voel ik me behaaglijk en prettig	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
28	In gezelschap van onbekende mensen ben ik verlegen	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
29.	De laatste tijd voel ik me ontspannen	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
30	Wanneer ik mijn leven nog eens over zou moeten doen, zou ik het net zo doen	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

31	Ik vind het vervelend veel mensen om me heen te hebben																
32	Ik slaap de laatste tijd goed																
33	Ik ben vaak uit mijn humeur zonder dat ik weet waarom																
34	Ik voel me nog tot alles in staat												nooit	1 keer	2 keer	3 en meer	
35	Als ik op reis zal gaan voel ik me ontspannen																
36	De laatste tijd heb ik veel zelfvertrouwen																
37	Dat ik patiënt ben, kan ik aanvaarden				oneens	beetje oneens	beetje eens	eens									
38	Als ik iets snel moet doen gaat het vaak mis																
39	Ik heb voor veel dingen belangstelling																
40	Zelfs als ik niets bijzonders doe voel ik me gauw moe																
41	De laatste tijd voel ik me zeker																
42	Ik zie op tegen zwaar werk																
43	Ik voel me de laatste tijd lichamelijk gezond												nooit	1 2 keer	3 4 keer	5 en meer	
44	Ik voel me nogal eens lusteloos																
45	De laatste tijd ben ik tevreden																
46	Ik zit vaak in de put																
47	Ik ben vaak zenuwachtig																
48	Ik ben gauw buiten adem																
49	Ik voel me nog best in staat om aan sport te doen																
50	Op andere mensen heb ik weinig invloed																
51	Af en toe ben ik zo slecht gehumeurd dat niemand het mij naar de zin kan maken																
52	De laatste tijd voel ik me prettig																

Curriculum Vitae

Rien (Marinus) H.M. Breteler was born in Sittard on June 16th, 1956. In 1968 his family moved to Renkum and he visited secundary school (Atheneum A) in Wageningen from 1968 to 1974. After graduation he worked as an assistant-controller but left this job a year later and started his studies in Psychology at Utrecht University in 1975. From 1978 till 1981 he worked as a steward for KLM Royal Dutch Airlines. Then he took up his studies again, graduated in 1984, and started to work on the research project that resulted in the articles, edited in this book. Since February 1988 he works at Nijmegen University at the Department of Clinical Psychology and Personality. In the same year he earned his registration in the Register of Clinical Psychologists (NIP-registration). Within a year he hopes to gain his registration as a behavior therapist. His current research activities concern evaluation of drug free detention for drug abusers and the role of motivation in the change of drug abuse.
And last, but certainly not least, he is looking forward to the birth of his child, due in February 1989.

Stellingen

1 Er bestaat tot nu toe geen behandeling voor stoppen met roken die repliceerbaar succesvoller is dan alle andere

2 Algemene maatschappelijke maatregelen, zoals een verbod op sigarettenreclame, beeindiging van de subsidie aan tabaksproducenten, besluiten van werkgevers om het roken in de werksituatie te beperken, en verspreiding van houdingen die roken sociaal onaanvaardbaar maken, zullen een afname van rookgedrag bespoedigen
(Zie Schwartz, J L (1987) Review and evaluation of smoking cessation methods the United States and Canada, 1978 1985, p 132)

3 Het publikatiebeleid van wetenschappelijke tijdschriften ten aanzien van evaluatiestudies leidt er toe dat onderzoekers discutabele methodologische criteria blijven hanteren en zodoende overmatig positieve uitkomsten presenteren

4 In experimenteel onderzoek is wel geconcludeerd dat nicotinekauwgum een positieve invloed heeft op het succes bij stoppen met roken omdat de uitkomst van onderzoekscondities verschilde Voordat men deze conclusie mag trekken dient een manipulatiecheck (onder andere op aantal en duur van het gumgebruik) bevredigende resultaten op te leveren

5 De opmerking van Fiser (1982), dat iemand die graag met roken zou willen stoppen "als hij dat gemakkelijk zou kunnen", geen dissonantie ervaart, is onjuist
(Dit proefschrift)

6 Motivatietheorieen dienen een concept te bevatten dat verwijst naar de verwachting om aan waargenomen situationele eisen te kunnen voldoen

7 Voor succesvol stoppen met roken door middel van therapie is het geheel doorlopen van de therapie belangrijker dan de motivatie voor het begin ervan

8 Omdat aansporingen tot stoppen met roken een positieve invloed hebben op de motivatie tot verandering van rookgedrag dient het gezondheidsbeleid van de overheid zich te richten op kennisvermeerdering van de schadelijke effecten van roken

9 De cosmetica-industrie neemt resultaten van dieronderzoek ten aanzien van de effecten van haar producten op de gezondheid uiterst serieus De sigaretten-industrie zou hetzelfde moeten doen ten aanzien van haar product

10. Ondanks een daling in de loop der jaren rookt in 1988 25% van de 14-jarigen (Stichting Volksgezondheid en Roken, 1988). Gezien de aanwezige kennis over de schadelijke effecten van roken is hier sprake van ernstig tekortschieten van overheid en gezondheidszorg.

11. Mondelinge enquêtes over de kwaliteit van het openbaar vervoer dienen op regenachtige herfstavonden rekening te houden met vertekening van de antwoorden.

12. Waar een berg is, is een weg.

Stellingen, behorende bij het proefschrift van M.H.M. Breteler, "Smoking cessation: some determinants of motivation and success".
Katholieke Universiteit Nijmegen, 16 november 1988.