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EFFECT OF A PROGRAM OF AEROBIC EXERCISE ON THE SMOKING BEHAVIOUR OF A GROUP OF ADULT VOLUNTEERS

The Ohio State University

PH.D. 1982

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EFFECT OF A PROGRAM OF AEROBIC EXERCISE ON THE
SMOKING BEHAVIOUR OF A GROUP OF ADULT VOLUNTEERS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

John Stanley Hill, D.P.E., M.A.

* * * * *

The Ohio State University
1982

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CHAPTER I

INTRODUCTION

The problem is clear. In the face of overwhelming evidence that smoking is harmful, neither the individuals who continue to smoke nor society as a whole have engaged in what seems to be appropriate action. Although it is true that no individual smoker can be sure he will be adversely affected, the smoking of cigarettes represents a form of Russian Roulette in which the odds for a long and healthy life are markedly reduced. A disinterested observer committed to rationality might find any survival of smoking incredible. (37:2)

Since the first evidence emerged some twenty-five years ago linking the smoking of cigarettes with lung cancer, most authorities in the health field have attempted to discourage young people from starting to smoke cigarettes and to encourage those who are smoking to stop. There seems also to be mounting evidence that the deleterious effects of smoking cigarettes are not just confined to the respiratory area - lung cancer, emphysema, chronic bronchitis, etc. There are many experts in the area who would support Guilford's finding that "the death rate for smokers from all causes is higher than the death rate for non-smokers and ... the risk of dying increases with the amount of cigarettes smoked". (22:23)

How critical a threat to health is cigarette smoking? In 1971, in the United States, the annual social and economic costs were estimated at 200,000 excess deaths, 11
million cases of chronic illness, and 77 million lost work
days due to cigarette smoking. (33:147) In a Statistics
Canada report published in 1979 it was reported that, in
1977, the number of smokers declined to 43% of the popula-
tion over age 15. This figure had declined gradually from
close to 50% in 1965 to 44.5% in 1974 to the 1977 level.
It was pointed out, however, that the remaining minority
are smoking more per capita than in the past. (50:14) A
more recent Canadian study published in 1981 by Goldfarb
Consultants (18) reported that the percentage of smokers
in the population over 15 had dropped even lower to approx-
imately 40%. This report indicated that slightly more than
two out of three (68%) cigarette smoking parents surveyed
admitted to smoking about the same amount as they had six
months before. Those parents smoking less amounted to only
16%. Only one out of four young smokers (25%) were smoking
less when surveyed than six months previously. The balance
(75%) were either smoking the same or more than they did
six months before.

In a U.S. analysis published in 1976, McAlister stated
that if all smokers were to cut down to less than ten cig-
arettess per day the incidence of lung cancer could be
reduced by 83% by 1985. The same author estimated that,
if it were possible to reduce everyone's risk to that of a
non-smoker (that is, if all cigarette smokers were to quit),
this would result in a 25% reduction in deaths from coronary heart disease. (33:147)

The unfortunate aspect of these macabre statistics is that it is not possible to blame some outside germ or infectious agent for the morbidity and mortality caused by cigarette smoking. In this case, it is man's behaviour which has been his undoing. As Suchman has stated, while the medical cause of lung cancer may be some kind of chemical in tobacco smoke, the psycho-social cause is a form of behaviour - cigarette smoking. (51:106)

More and more emphasis has been placed recently upon the modification of health-related behaviour as a means of reducing morbidity and mortality. As Haggerty so succinctly stated,

One's lifestyle, including patterns of eating, exercise, drinking, coping with stress and the use of tobacco and drugs, together with environmental hazards, are the major known modifiable causes of illnesses in America today. Medical care on which we spend so much has, in comparison, only a weak effect on health. (23:276)

There seems to be consensus that our way of life, our lifestyle, is the single, most important modifiable factor influencing our health and welfare today.

If this is so, then what is the problem with cigarette smoking? A problem of some magnitude certainly does exist as this type of behaviour is remarkably resistant to change
or modification. A review of some 87 studies of smoking cessation by Hunt and Matarazzo indicated that there was a fairly high relapse rate with some 66% of those completing treatment resuming smoking within three months. (27:107) A review of adult smoking intervention studies by Thompson (53) reflected a fairly typical pattern. Success rates ranged from 40% - 97% immediately after the treatment, dropping to 18% - 53% after three months, to 15% - 35% after six months and to 16% - 27% after 12 months.

Why is smoking behaviour so difficult to change or modify? Factors which emerge quickly are: (a) many people start smoking cigarettes at quite an early age and by age 35 may have been smoking steadily for up to 25 years; (b) smoking is a learned behaviour, and, (c) smoking cigarettes is socially acceptable and is, therefore, socially reinforced for both men and women. Denson stated that "it is this high degree of social acceptance which blinds us to the real nature of cigarette smoking and makes us continue to use inappropriate and inaccurate terms in describing it". (9:51)

Another factor has to do with the perception of cigarette smoking as a habit rather than as an addiction. Denson developed a persuasive argument that our inability to significantly interfere with the behaviour of cigarette smokers was to a large extent due to society's inability to
label smoking an addiction. "There is no proof in the scientific and medical literature that well-established cigarette smoking is less addicting than the use of the opiates; much of the evidence, in fact, points in the opposite direction". (9:52)

It is, however, possible to change smoking behaviour. McFall and Hammen (34), in a wide-ranging review of the scientific literature in the area of smoking cessation, noted that they had found no treatment modality which had been clearly successful in the long term. They do, however, report that all studies indicated a highly significant reduction in smoking rate at the end of the treatment period irrespective of the specific form of treatment used. As a reduction of this magnitude does not occur when the subjects are left to their own devices, the authors concluded that "there must be something about receiving treatment - any smoking treatment - that produces this smoking reduction". (34:80)

Need For The Study

A great number of different strategies have been tested scientifically in the area of smoking cessation and these have achieved limited success. Among those tested have been relaxation, satiation, and combined relaxation/satiation (52), nicotine chewing gum (44), hypnosis (8), hypnoaversion
(39), stimulus control (21), muscular relaxation (43), biofeedback (55), and chemotherapy (19). In another summary of the different approaches used, Schwartz (45) listed ten discrete categories: a) individual counselling, b) educational programs, c) group counselling, d) hypnosis, e) medication, f) aversive conditioning, g) self control, h) mass-media, i) community approaches, and a comprehensive category referred to as miscellaneous. None of the approaches mentioned has been shown to be effective in the long term.

There have been several suggestions in the research literature that what is required is a lifestyle change approach, a re-structuring of life; in short, a human engineering approach to smoking cessation. (27, 28, 30, 33) More specifically, Morgan et al. (40) indicated that many adults who enter into a running program do so for health reasons, that these individuals are motivated by a desire to change their lifestyles in order to bring about positive changes in their health behaviour (nutrition, alcohol consumption, exercise patterns, cigarette smoking, etc.).

A number of studies (7, 36, 40, 49) have suggested that physical activity and, in particular, aerobic training, may be a useful tool in helping smokers achieve success in quitting. Schwartz (46) has supported the inclusion of activities such as jogging and swimming in smoking cessation programs while Kaplan and Cowles have stated that "a more
effective approach may be to encourage health-related
behaviours such as exercise". (30:134)

One of the major criticisms of smoking cessation pro-
grams in the past has been the focus on treatment and the
lack of emphasis upon maintenance and follow-up. Shewchuck
(48) observed that, in too many instances, the cessation
program is terminated and support systems withdrawn long
before the participant is able to cope on his own. Support
for this observation has been provided in a report by Hunt
and Matarazzo who demonstrated that 90% of recidivism
occurred in the three months immediately following treatment.
(27:456) If the answer is in the area of lifestyle change,
it would seem appropriate then to attempt to use physical
activity as an agent for change; that is, to have the
individual adopt physical activity as an integral part of
his lifestyle. Physical activity would then be the ever-
present, constant reinforcer of the change in behaviour
and lifestyle.

In the same vein, Shephard et al. (47) have referred
to the fact that smoking withdrawal clinics should "offer
a total approach to the re-structuring of life" while Hunt
and Matarazzo proposed "a more comprehensive human engin-
eering approach to our subjects, making more use of ancil-
lary supportive measures such as regulated exercise ...
and relevant recreational and social activity". (27:109)
It seems, then, that there would be value in experimentally testing the effect of physical activity in the area of smoking cessation. In addition, as secondary issues, there seems to be merit in examining (a) the long-term effect of physical activity on smoking behaviour during the maintenance or follow-up period, (b) the effect of physical activity on body weight (that is, would the addition of a physical activity component to a smoking cessation program counteract the increase in body weight which often accompanies stopping smoking), and (c) the effect of both physical activity and smoking cessation on resting heart rate and maximum oxygen intake.

Statement of the Problem

The purpose of this study is to test the effectiveness of physical activity as an intervention strategy in smoking cessation. Specifically, a group of smokers engaged in both a smoking cessation counselling program plus a cardiorespiratory (aerobic) training program was compared with a group of smokers engaged in only a smoking cessation counselling program.

Research Hypotheses

The problem under investigation was viewed as a composite of one main hypothesis and four minor hypotheses.
The main hypothesis under examination was that a group counselling smoking cessation program supplemented by a cardiorespiratory (aerobic) exercise program would bring about a significantly greater reduction in the smoking behaviour of adults than would a "normal" group counselling smoking cessation program.

One auxiliary hypothesis was that the group counselling smoking cessation program supplemented by a cardiorespiratory or aerobic exercise program would bring about a significantly greater reduction in the resting heart rate of the experimental group than would occur in the control group as a result of the group counselling smoking cessation program.

A second auxiliary hypothesis was that the physical activity component of the experimental treatment would have a significantly greater carry-over effect when compared with the control group program at the termination of the maintenance or follow-up period; that is, the experimental group would still have a significantly lower smoking behaviour score when compared with the control group at the end of the follow-up period.

The third auxiliary hypothesis was that the physical activity component of the experimental program would result in a significantly smaller increase in body weight in the experimental group when compared with the control group at the end of the follow-up period.
The fourth and final auxiliary hypothesis was that the physical activity component of the experimental program would result in a significant increase in maximum oxygen intake in that group when compared with the control group at the end of the follow-up period.

Limitations

1. The subjects did not consist of a random sample drawn from a larger population. The subjects consisted of volunteers, that is, smokers who wished to stop smoking and who had volunteered to participate in the study. In addition, these volunteers had emerged from a larger group who had responded to the advertisements but who had decided, perhaps, because physical activity was involved or a financial deposit was necessary or the time of the sessions was inconvenient or some combination of these, not to participate further in the project.

2. The two groups of subjects did not contain equal numbers of males and females (five males and 13 females in each group) and, as a consequence of this, no analysis of male/female differences in smoking behaviour was attempted.

3. The subjects in the Control group were initially instructed to keep their outside physical activity pattern stable and, although they were reminded of this throughout the course of the study, there was no way of ensuring that
these instructions were followed other than the self-reporting technique described in the Methodology.

4. The self-reporting techniques used (initial smoking behaviour and Self Motivation Inventory questionnaires, for example) pre-suppose that the subjects are responding honestly. Again, there was no way of ensuring that this was so.

5. The subjects' behaviour outside of the study sessions (for example, dietary practices or the use of other smoking cessation methods) was difficult if not impossible to control.

Definitions

A smoker. A person who was smoking ten or more cigarettes per day.

Smoking behaviour score. The mean number of cigarettes smoked each day during the previous seven days.

Maximum oxygen intake. The maximum amount of oxygen able to be taken in, transported, and utilized at the cellular level. It can be expressed in litres of oxygen per minute (lit./min.) or, more accurately, in millilitres of oxygen per kilogram of body weight per minute (ml./kg./min.). This measure has become generally accepted as a valid measure of aerobic fitness.

Volunteer. A person who, having been apprised of all of the details regarding the research project, agreed, of his own
free will, to participate.

**Aerobic exercise.** A program of continuous, rhythmical physical activity (for example, walking, jogging, cross-country skiing, skating) which is submaximal in nature and which, if frequency, intensity and duration are sufficient, will bring about an increase in the capacity to perform physical work.
CHAPTER II
REVIEW OF THE LITERATURE

The review of the literature which covered the period from 1965-1981, was developed in two major sections. In the first section can be found (a) those studies and articles in which the authors concluded that physical activity had or could have a positive influence in the area of smoking cessation; and (b) those studies and articles in which the authors concluded that physical activity had little or no effect on smoking behaviour. In the second section studies have been reviewed in areas somewhat more tangential to the central research question but nevertheless germane to the study being reported. These include (a) heart rate (b) contingency contracting (c) carbon monoxide in expired air (d) group counselling.

Prior to entering into the review of the literature, it should be noted that the literature review for this study uncovered no experimental studies in which physical activity had been used as the independent variable and smoking behaviour as the dependent variable. (The Morgan et al. study (40) was a retrospective examination of smoking behaviour.) In those instances where the effect of physical activity on smoking behaviour was discussed, physical activity was incidental to the principal thrust of the research being carried out.
Positive Studies

Morgan et al. (40) investigated the effect of physical activity on smoking behaviour by mailing a questionnaire to the 165 members of the Canadian Masters International Track Team - a group established to foster participation/competition in running among adults over 40 years of age. From the 141 usable responses, it was found that (a) the mean age of the group was 47 years, (b) the average distance covered per week was 35 miles, (c) only three of the 35 participants who had been smokers when they started running were still smoking.

The 35 smokers were all members of a larger group (83 in number) who had taken up running after age 21 and who were identified as being less likely to have attended college, less likely to have been coached and less likely to have started running as training for a sport. The authors concluded that, despite the extremely positive results gained from their retrospective study, "the practicability of an anti-smoking program based on aerobic exercise still remains to be demonstrated". (40:42)

In a letter to The Lancet, Carruthers et al. (7) discussed a British Sports Council study concerned with the effect of a specially designed program of physical activity on the cardiovascular health of a group of 2000 middle-aged men, approximately a fifth of whom had a history of coronary
heart disease. Unfortunately, while no details of the program or of the results of the study were given, the authors did state that "many of the exercising subjects learn to relate cigarettes to impaired physical condition and so cut down or, more often, stop". (7:447)

The report by Stamler et al. (49) is typical of many which have appeared in the research literature over the last two decades. The authors described the Coronary Prevention Evaluation Program (CPEP) which was set up in an attempt to gain experience in the long-term management of hypercholesterolemia, hypertension, obesity, cigarette smoking, and physical inactivity in coronary-prone men, aged 40-59 years. The program did not involve supervised exercise but was limited to giving guidance regarding the approach to be used in the development of a program of regular, moderate exercise.

The principal focus of the program was on increasing the participant's involvement in daily physical activity. Activities such as stair climbing, walking to and from work, cycling, swimming, jogging, calisthenics, sports, and household chores were encouraged. The goal was to increase what the authors described as "cardiopulmonary fitness". Participants were interviewed on a regular basis and based on these data together with information gathered from the seven day exercise diaries completed by the
participants, the authors concluded that a good percentage of the group had changed from a previously sedentary pattern to a lifestyle which included regular light exercise. One of the outcomes recorded was that approximately 30% of those who had been cigarette smokers had been able to quit and were still able to report success after one year.

In 1972, Durbeck et al. (12) designed a study "to assess the feasibility of establishing an effective exercise program with careful medical evaluation within the employment setting of a federal agency" and "to identify and define those factors (personal and programmatic) that influence volunteering for and adherence to an exercise program as well as effectiveness of the program in modifying selected cardiovascular risk factors and health attitudes and behaviours". (12:784) Of the 998 persons who met the initial criteria, 348 volunteered for the program, 271 completed baseline tests, and 237 completed the re-test examination. Participants were involved in three treatment programs: (a) the Stress Lab Program (individual exercise programs on bicycle ergometers), (b) supervised jogging, and (c) individual unsupervised exercise.

After twelve months, the participants reported a number of changes including increased positive feelings about their health status, more energy and stamina, reduced weight, and lowered stress levels. They also reported
engaging in more physical activity outside of work, greater participation in recreational activity, better sleep and rest and a reduction in cigarette smoking. Unfortunately, although reference is made to the reduction in cigarette smoking, this finding is never elaborated upon or discussed further.

Meyer and Henderson (38) carried out a study with 36 employees of the Varian Corporation (Palo Alto, California). These subjects were screened from an initial group of volunteers on the basis of their identification as a coronary heart disease high risk group. High risk factors of interest to the authors were obesity, cigarette smoking, lack of physical activity, and diet. The participants were randomly assigned into three treatment groups: behaviour modification, individual counselling, and single-time consultation with a physician. The goal of the study was to effect behaviour changes in areas such as body weight, diet, smoking, and physical activity and, as a result, to lower serum cholesterol and triglyceride levels.

It was found that with cigarette smoking, behaviour modification was significantly more effective in reducing the number of cigarettes consumed per day when compared with the physician consultation treatment whereas the individual counselling was not at all effective. Both behaviour modification and individual counselling groups increased
their level of physical activity significantly when compared with the physician consultation group. The authors were unable to state whether the physical activity increase was at all responsible for the reduction in smoking behaviour in the behaviour modification group.

Shephard et al. (47) discovered a substantial weight gain (especially at the end of one year) in those who had been successful in quitting smoking. The authors suggested that although the effect of this weight gain on subsequent mortality is small compared with that of continued smoking, control of body weight constitutes a critical, visible reward, especially with women. "The practical lesson here seems to be that those organizing smoking withdrawal clinics should adopt a total approach to health which should include giving patients advice on diet and the need to increase physical activity". (47:550)

Schwartz (46), one of the most prolific writers in the area of smoking withdrawal, recently strongly supported the development of cessation programs involving physical activity. As he noted, "the current popularity of physical fitness could be used to devise cessation methods centred on exercise such as jogging or swimming since these activities require good breathing ability and are incompatible with smoking". (46:563)
Negative Studies

A study by Heinzelmann and Bagley (25) involved sedentary, 45-59 year old males who had exhibited one or more of a variety of coronary high risk factors - hypertension, obesity, cigarette smoking, lack of physical activity, and diet. The 239 men involved participated in supervised physical activity for one hour, three times per week over an 18 month period. A control group was also selected. Following the program, the exercise participants reported that physical activity had resulted in better sleep and rest patterns. In both the exercise and control groups, roughly 20% of the subjects reported a reduction in smoking behaviour.

Ilmarinen and Fardy (28) designed a study which involved 166 males who were considered to be at high risk for coronary heart disease as they had higher than normal levels of blood pressure or blood lipids, were overweight or sedentary, or smoked cigarettes. The subjects were followed for three years to examine the effect of a long-term regular physical activity program on the incidence of coronary heart disease. The men were divided into two groups, an exercise group (n = 82) and a control group (n = 84). Although the exercise group showed a 20% increase in predicted maximum oxygen intake, no significant differences were observed between the groups in body weight, serum cholesterol, blood pressure or smoking habits.
As a result of a heart disease screening program involving policemen, firemen and sheriff's deputies in Sacramento, Calif., Bonnano and Lies (3) established a research study with a group of 40 coronary high risk volunteers. The subjects were matched on age, occupation, fitness level and risk factors (body weight, cholesterol level and smoking behaviour) and were randomly assigned to an exercise or control group. The goal of the study was to examine the effect of a physical activity program (three times per week for 12 weeks) on the specific high risk factors identified.

The physical activity program was effective in improving physical fitness (maximum oxygen intake, etc.) and in bringing about a significant reduction in systolic blood pressure in the hypertensive members of the exercise group. There was no similar reduction in blood pressure in the control group. The physical activity program, however, was not effective in bringing about changes in body weight, cholesterol level, or smoking behaviour.

Summary. It may be concluded from the foregoing review of the literature that (a) the role of physical activity, specifically aerobic training, in smoking cessation has not been established, but that (b) enough evidence exists to suggest that this area would be a fruitful area for investigation.
Heart Rate Studies

Acute effect of cigarette smoking on heart rate.
Houben et al. (26) in a study investigating the effect of certain drugs on hypertension, found that those hypertensive subjects who were asked to smoke two-thirds of two standard non-filter cigarettes while not on medication had a mean heart rate increase of 16 beats per minute. These authors had previously established that the physiological and haemodynamic effects of smoking cigarettes were very similar in normotensive and hypertensive individuals.

In a study involving sixteen hypertensive patients who were habitual coffee and cigarette users, Freestone and Ramsay (16) tested the effect of (a) a placebo (b) coffee (c) cigarette smoking (d) coffee and cigarette smoking on heart rate and a number of other variables. The smoking only treatment group had a mean heart rate which was still elevated by 12 beats five minutes after smoking a cigarette, by 11 beats after 15 minutes, by six beats after 30 minutes. Heart rate was still slightly elevated 60 minutes and 120 minutes after the smoking episode.

Effect of smoking cessation on heart rate. Butts and Golding (4) conducted a study involving 28 males and females (age range 25 - 45 years) who had been smoking one package or more of cigarettes per day for at least eight years. The subjects were asked not to smoke for one hour prior to
reporting to the laboratory and to maintain abstinence from cigarettes for 24 hours. Testing was carried out at the start of this 24 hour period and again at the end. A wide variety of haematological, physiological, and pulmonary function tests were administered. A two-stage submaximal bicycle ergometer test was part of this test battery. Of particular interest was the heart rate data collected at rest, during exercise, and during recovery. When the pre- and post-test measures were analyzed the heart rate data showed significant reductions at rest, during exercise, and during recovery. These significant differences occurred in both men and women over the 24 hour period.

In a study involving 12 healthy smokers, Bojholm et al. (2) measured blood pressure and heart rate over a five week period while the subjects were both physically active and resting and during both smoking and non-smoking periods. For a two week period, which was chosen at random, the subjects were not permitted to smoke. Analysis of the data showed no statistically significant difference in blood pressure between smoking and non-smoking periods but a statistically significant reduction in heart rate was detected during the non-smoking period.

Effect of exercise or training on heart rate. The classic bradycardia or reduction in heart rate while at rest and during sub-maximal exercise as a result of aerobic
training has been extensively documented in the research literature.

Support for the reduction in resting heart rate as a result of aerobic training has been found in studies reported by Karpovitch (31), Carlston and Grimby (6), and de Vries (10). In the case of heart rate during a standard amount of sub-maximal exercise, research findings by Fox et al. (17) and Ekblom et al. (14) substantiate this reduction following a period of aerobic training.

In summary, the studies reviewed indicated a tendency for heart rate (a) to rise acutely following the smoking of a cigarette (b) to drop, in chronic fashion, following a period of smoking cessation and (c) to fall, in chronic fashion, following a period of aerobic training.

**Contingency Contracting**

The use of a contingency contract (having smokers establish a contract which imposes a reward or penalty for compliance or non-compliance with a plan or schedule) has been investigated by some researchers.

Paxton (42) designed a study in England which involved a financial deposit contract as a component in a package program to assist smokers in quitting. The author viewed a contingency contract with a monetary deposit as a useful external control technique due to the failure of numerous
self-control strategies. Sixty smokers (38 females, 22 men) were recruited by newspaper advertisements and by referrals from physicians and assigned to four deposit groups and four no-deposit groups. The groups, which were run consecutively, all received the same smoking cessation treatment package with the deposit contract used with 50% of the groups.

A deposit of 20 pounds was to be repaid at the rate of five pounds per week as long as no smoking occurred during each one week period. If the subject smoked during the one week period, the five pounds was forfeited and shared among the other group members who had not smoked. At the end of four weeks the subjects were asked to deposit another twenty pounds. This was to be repaid at the rate of ten pounds every two weeks assuming that no smoking had taken place.

Using the pooled data from the eight groups it was found that the deposit contract had been successful in achieving a difference in smoking behaviour during the two month period of the study. This difference was statistically significant at the end of one month but not at the end of the second month. By the end of three months this difference in smoking behaviour had disappeared.

A study by Elliott and Tighe (15) was unique in that contingency contracting was the only strategy employed in their smoking cessation study. The authors recruited 25
subjects from students, teaching staff and wives of staff at Dartmouth College. A deposit of $65 was obtained and this was refundable in amounts varying from $10 to $20 over a 16 week period. Refunds were earned after non-smoking for increasingly longer periods of time. Smoking any form of tobacco during the 16 week period resulted in the forfeiture of the balance remaining.

Although this study was relatively unsophisticated and lacked rigorous control in the design, it did produce interesting results. Of the 25 subjects, 21 abstained from cigarette smoking for the 16 weeks of the program. This constituted a success rate of 84%. At the end of a 15 month follow-up period recidivism had taken its normal toll and only nine of the 25 subjects were still not smoking. This was the equivalent of a 36% success rate.

In a further attempt to investigate the impact of a financial contingency contract, Winette (57) recruited 70 smokers by means of advertisements in newspapers. Of these, 45 subjects eventually posted a $55 deposit. Winett examined the role of both a contingency contract and a maintenance program in a four group design as follows: contract, maintenance; no contract, maintenance; contract, no maintenance; and no contract, no maintenance.

Although all subjects made the $55 deposit, only the subjects in the groups labelled "contract" had to earn the
refunds by adhering strictly to a smoking reduction and smoking cessation schedule during the eight weeks of the program. In the "no contract" groups, the refunds came automatically at designated points and were not contingent upon compliance with a schedule. All forfeited deposits were shared with other participants.

Contingency contracting was extremely effective in this study during the treatment but there were no significant differences between groups in terms of the number of subjects still not smoking at the end of either the three or six month follow-up period.

Discouraged by the results obtained from smoking cessation studies involving aversive conditioning but somewhat encouraged by a study he conducted using contractual management, Lando (32) designed an investigation which compared a multi-facetted maintenance program with a control condition which was limited to aversive conditioning. The 34 subjects were recruited by means of a newspaper advertisement and randomly assigned to experimental and control conditions. Both groups received six sessions of satiation therapy during a seven day period. Following this the experimental group attended seven maintenance sessions spread over a two month period. The gap between these sessions was gradually increased from 48 hours to two weeks. This gradual phasing out of the treatment also was accompanied by a phasing in of
personal responsibility.

Part of the experimental maintenance treatment was a refundable deposit of $20. Subjects pledged to forfeit a sum of money for every cigarette smoked - the actual amount was left up to the individual. Contracts could be renewed at one month intervals.

At the end of the six month follow-up period, 76% of the experimental group were non-smokers compared to 35% in the control group.

To summarize, although the evidence supporting the efficacy of financial contingency contracting is ambivalent and the waters often muddied by the presence of other factors (as in the Lando study), there seems to be enough evidence to conclude that the use of a refundable monetary deposit in a smoking cessation program can be effective during the treatment period.

Carbon Monoxide and Smoking

Ayres et al. (1) set out to assess the prevalence of carboxyhemoglobinemia in people living and working in metropolitan New York City. The study involved the gathering of data by survey questionnaire, and the obtaining of blood samples from policemen, workers in two of the city's large vehicular traffic tunnels, pedestrians, and office workers.
The results showed that cigarette smoking was the most critical factor in the development of blood carboxyhemoglobin levels. "The mean concentration of carboxyhemoglobin in non-smoking policemen working in highly congested Manhattan precincts was still lower than that of smokers studied in less highly polluted areas of New York City". (1:328)

The use of a blood sample analysis to measure the carboxyhemoglobin level in order to corroborate smoking/non-smoking status is expensive and time consuming. Wald et al. (54) designed a study to test the relationship between the level of blood carboxyhemoglobin and carbon monoxide in the breath using a relatively inexpensive instrument, the Ecolyzer.

The study involved 11,249 men aged 35-64 who had attended the B.U.P.A. Medical Centre in London, England for a comprehensive medical examination. A sample of venous blood was obtained from each man together with his recent smoking history. By analysis, the carboxyhemoglobin value was obtained. Within five minutes of the blood sample being obtained, three samples of alveolar breath were collected and immediately analyzed by means of the Ecolyzer instrument. When the relationship between alveolar breath carbon monoxide concentration and blood carboxyhemoglobin was examined statistically in a sub-sample of 162 smokers
and 25 non-smokers, the correlation coefficient was found to be 0.97.

In a similar study, Jarvis et al. (29) obtained both venous blood samples and expired air samples from 182 subjects recruited from the smoker's clinic at King's College Hospital Chest Unit. Once again, the expired air sample was immediately analyzed using the Ecolyzer carbon monoxide analyzer. The correlation coefficient between the expired air carbon monoxide reading and the blood carboxyhemoglobin level was 0.98.

In summary, the data have established the prime role of cigarette smoking in raising the level of blood carboxyhemoglobin and that the Ecolyzer, when correctly used, produced an inexpensive, efficient and valid means of estimating blood carboxyhemoglobin by measuring the level of carbon monoxide in alveolar air.

**Group Counselling**

Group counselling is the name used to describe an approach to smoking cessation in which a group of smokers meet on a regular basis with a leader, counsellor, or therapist and move towards cigarette abstinence through a series of planned programs involving activities, assignments, group projects, quitting contracts, etc. Discussion of individual problems and group and leader support are integral components
of the approach. Behaviour modification may or may not be used by the leader although many group counselling approaches use some or all of the following as outlined by Mahoney (35): 1) self-monitoring of smoking behaviour, 2) goal-setting, 3) nutritional, exercise and health counselling, 4) tangible operant consequences (reward and punishment), 5) aversion therapy, 6) social reinforcement in the form of therapist, group, or family support, 7) covert conditioning and cognitive restructuring strategies, 8) self-presented consequences (self-reward, self-punishment), and 9) stimulus control procedures.

Harrup et al. described the operation of the Kaiser Permanente Stop Smoking Clinic as "an educational program that uses group counselling in a flexible eclectic fashion designed to meet a variety of individual needs including a directive, didactic component provided by the group leader and a group support counselling component". (24:1226)

The Clinic covered an eight week period with 13 90-minute sessions. During the early meetings the group was encouraged to discuss individual smoking experiences, feelings about quitting, and to raise questions. Stressed were (a) internal/intrinsic motivation, (b) what quitting smoking will do for you!, (c) quitting is possible. In addition each member was asked to record for each cigarette smoked: 1) time, 2) circumstance, 3) emotional state,
4) level of craving, 5) cue which aroused craving, 6) expected gratification, 7) experienced gratification. Leader distributed material was designed to assist members of the group cope with the urge to smoke. The fifth session was the common quitting date and a buddy system was established. Meetings nine through thirteen were considered maintenance sessions. This group counselling approach was relatively successful with a cumulative success rate of approximately 45%.

In the Lando study previously reviewed (32), the maintenance or experimental component of the study was described by the author as a "broad-spectrum behavioural approach" which was essentially group counselling using a variety of strategies including contingency contracting. This approach had a success rate of 76% relative to 35% in the control condition.

In a review of the smoking cessation literature, McAlister (33) indicated that "no one should be particularly surprised to find that one of the most important elements in a program to help people quit smoking is the social influence provided by the person who is administering the treatment and the other individuals involved". (33:153) McAlister went on to say, however, that this area was extremely difficult to research and interpret due to individual differences among leaders, subject populations,
settings, etc.

To summarize, although, once again, the evidence is ambivalent, the group counselling approach offers the flexibility one needs to mould a smoking cessation program to the needs of a group of individuals and, therefore, warrants further study and exploration.

Summary by sections

The literature review has established that:

1. The role of physical activity, specifically aerobic training, in smoking cessation has not been established, but that enough evidence exists to suggest that this area would be a fruitful area for investigation.

2. There is a tendency for heart rate (a) to rise acutely following the smoking of a cigarette (b) to drop following a period of smoking cessation and (c) to fall following a period of aerobic training.

3. There seems to be enough evidence to conclude that contingency contracting can be effective as a treatment strategy during a smoking cessation program.

4. Cigarette smoking plays a prime role in raising the level of blood carboxyhemoglobin and that the Ecolyzer can be used effectively to measure the level of carbon monoxide in alveolar air.

5. Group counselling offers the flexibility one needs to mould a smoking cessation program to the needs of the participants.
CHAPTER III
METHODOLOGY

To determine what effect a program of aerobic exercise might have upon the smoking behaviour of a group of adult volunteers, it was necessary to recruit a number of cigarette smokers who wished to quit smoking. It was critical also to establish the variables to be measured, the procedure to be followed, the design of the study, and the statistical techniques to be used in the analysis of the data.

Subjects

During the months of April and May, 1981, advertisements were placed in the London, Ontario, Free Press, the University of Western Ontario Western News, and a local cable television station. As a result of these advertisements a group of 80 individuals was identified. They were all cigarette smokers with a serious interest in quitting smoking.

For a variety of reasons (for example, the time of day at which the research was to be conducted, the need to be physically active, the financial deposit requirement) a number of the respondents decided not to participate in the study. Finally, a group of 36 individuals (26 females, 10 males) volunteered to act as subjects in the research project.
In order to comply with the criteria established by the University of Western Ontario Faculty of Physical Education Human Experimentation Committee, all subjects under age 35 were required to complete the PAR-Q questionnaire (Appendix A). Subjects 35 years or older were required to submit a medical certificate indicating they possessed satisfactory health status and that normal progressive sub-maximal physical activity would be in order. The letter to the physician and the resulting medical certificate are to be found in Appendix B.

All subjects made a $25 deposit with the understanding that it would be refundable under the following conditions: (a) $10 if the subject was a non-smoker at the end of the five week treatment period, and (b) the final $15 if the subject was still not smoking at the conclusion of the one month follow-up period. It was agreed that all deposits "lost" would be donated to the London and Middlesex Lung Association, London, Ontario.

Subjects were randomly assigned to one of two groups which differed only in their level of physical activity (n = 18 in each). As assignment to the experimental group (physical activity) was a possibility for all subjects, subjects were warned at the outset that the research study could involve reasonably strenuous physical activity. Those assigned to the control group were instructed to keep
their physical activity patterns stable (that is, they were asked not to start any new physical activity nor to discontinue any activity in which they were currently involved for the course of the study).

**Dependent Variables**

A number of measures (dependent variables) were obtained on each subject. These measures lay within four general categories: demographic information and smoking history (including a current smoking behaviour score), body weight, physiological parameters (maximum oxygen intake, resting heart rate, carbon monoxide concentration), and psychological parameters (Self Motivation Inventory).

**Demographic and smoking history.** All subjects were asked to provide demographic and smoking history information including name, address, age, sex, the mean number of cigarettes currently being smoked per day, the number of years he or she had smoked, the age at which regular smoking commenced, the brand of cigarettes currently smoked, the number of previous attempts to quit smoking, the period of time since the last attempt, and the reason for attempting to quit smoking at that time. A copy of the questionnaire is to be found in Appendix C.

**Body weight.** Body weight was established using a standard Fairbanks and Morse balance scale. The scale was
calibrated by a Scale Company Serviceman prior to the first testing period and thereafter was only used during testing periods. Subjects were weighed wearing T-shirt and shorts or slacks only.

Physiological measures. Three physiological parameters were assessed. The first, fitness level, as reflected by maximum oxygen intake, was measured using a sub-maximal bicycle ergometer test. The protocol which was followed is described in Appendix E.

The second physiological parameter measured was resting heart rate. Subjects were asked to take their resting heart rate immediately before rising on three consecutive mornings using palpation at the radial or carotid pressure point. The mean of the three readings was used in each instance as the resting heart rate value.

The third physiological parameter of interest was carbon monoxide concentration. The apparatus used was the Ecolyzer-CO Analyzer (Analygas Systems Ltd.). Subjects were asked to wear a nose clip, inhale and hold that breath for 20 seconds. After blowing out a small amount of air, a plastic bag was filled with air from the lungs. The probe from the Ecolyzer was then slid into the bag and a sample of air was pumped into the apparatus. Once the needle had stabilized the level of carbon monoxide in parts per million was read. This measure was used to corroborate a subject's
smoking/non-smoking status.

Psychological Measures. In order to control for the impact that individual differences in personality might have upon adherence to the physical activity and/or smoking cessation programs, a psychometric test as administered. The Self Motivation Inventory was developed by Dishman et al. (11) in an attempt to measure a person's predisposition to persevere with a physical activity program. The Self Motivation Inventory has been validated and achieved a test-retest reliability coefficient of 0.86. A copy of the inventory is attached as Appendix G.

Procedure

The experimental group (group counselling plus physical activity) met twice weekly for five weeks for a group counselling session. This session lasted from one to one and a half hours and was followed by approximately 30 minutes of physical activity of an aerobic nature (Appendix H). The approach used in the group counselling sessions was based upon that developed by the British Columbia Lung Association and entitled "Operation Kickit" (Appendix I). Session outline handouts have also been included in Appendix I. In addition, the Experimental Group was encouraged to engage in other forms of physical activity as often as possible at
other times during the week; e.g. when they felt like a cigarette it was suggested that they should walk or jog around the block, go for a bicycle ride, run on the spot in the basement; or if they were at the office, to walk up and down a flight of stairs, walk around the block, or around a downtown park. The amount of physical activity was recorded weekly on a specially designed form. (Appendix J).

The control group (group counselling only) met twice weekly for five weeks for a group counselling session. This session lasted from one to one and a half hours. As with the experimental group, the approach used in the group counselling was based upon the program entitled "Operation Kickit". (Appendix I). Again, the amount of physical activity in which the subject engaged was recorded weekly.

All sessions were conducted by a single leader, the author, who (a) has many years of experience as a fitness leader and fitness counsellor, and (b) has conducted a number of adult smoking cessation programs using the group counselling approach on behalf of the London and Middlesex Lung Association, London, Ontario.

At the initial testing session ($T_1$) all subjects completed the demographic and smoking history questionnaire and the **Self Motivation Inventory**. Data were also collected on body weight, fitness level, resting heart rate, and carbon monoxide concentration.
At the end of the five week treatment period (T2), one month after treatment ceased (T3), three months after treatment (T4) and six months after treatment (T5), the physiological, body weight and smoking behaviour score data were gathered also.

Design and Statistical Analysis

The basic design of the study was a 2 x 5 factorial comprised of two groups (group counselling only versus group counselling plus physical activity) tested over five test periods (an initial pre-test, a post-treatment test, and three retention tests; T1 - T5).

This general design (Table 1) conforms to the "Pre-test - Post-test Control Group Design" described by Campbell and Stanley (5). It also contains four of the five essential elements of the true experimental design as outlined by Green and Gordon (20). Green and Gordon (20) identified the following as being critical components of a true experimental design: "1) representative sample of target population or program recipients 2) pre-tests (measures preceding the educational intervention) 3) unexposed group for comparison 4) random assignment of the sample to experimental and control groups and 5) post-tests to measure effects after the educational intervention". (20:28) The current study design could not comply with only number one above as
<table>
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<tr>
<th>EXPERIMENTAL GROUP</th>
<th>T_1</th>
<th>EXPERIMENTAL TREATMENT</th>
<th>T_2</th>
<th>T_3</th>
<th>T_4</th>
<th>T_5</th>
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<td>ONE MONTH</td>
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<tr>
<td>TWO MONTHS</td>
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<td>THREE MONTHS</td>
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<td>CONTROL GROUP</td>
<td>T_1</td>
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it was not possible to draw a random sample from an identifiable population of smokers who wished to quit.

Two-way analysis of variance with repeated measures on one factor, using smoking behaviour and physical activity level as independent variables, and chi square were the statistical techniques used to analyze the data. When the analysis of variance demonstrated a statistically significant F value, post hoc comparisons were carried out using Duncan's Multiple Range Test (13).

The facilities of the Computing Centre, The University of Western Ontario, were used and the following programs selected. Using the SPSS: Statistical Package for the Social Sciences (41), the sub-program "CONDESCRIPTIVE" was used to develop descriptive statistics (mean, standard deviation, standard error, variance, etc.) for the two groups on the variables measured and this sub-program also verified the data. From the same source the sub-program "ANOVA" was used to conduct two-way analyses of variance using smoking behaviour and physical activity level as independent variables. Again, from SPSS, the sub-program "CROSSTABS" was selected in order to ascertain the proportion of those quitting smoking to those not quitting within the two groups and to establish whether these proportions were statistically different from each other.
Due to the unavailability of these programs within SPSS, two other analysis of variance programs were also employed, "ANOVAPACK" and "BALANOVA". Anovapack permitted a 2 x 5 analysis (Experimental Group versus Control Group by Smoking Behaviour Score) while Balanova allowed for a 2 x 2 x 2 and a 2 x 2 x 5 analysis (Quit versus Did Not Quit, Experimental Group versus Control Group by a variable over time).

As the investigation of the role of physical activity in smoking cessation was a new area of study and, as it would be important to identify as many as possible of the statistically significant differences in order to underline possible areas for further study, the .05 level of confidence was used throughout.
CHAPTER IV

RESULTS AND DISCUSSION

This chapter is divided into four principal sections, namely, 1) a descriptive statistics summary 2) an examination of the effectiveness of the intervention strategy, 3) the interaction of various factors with quitting behaviour discussed under (a) time-related factors (b) psychological factors, and 4) the impact of intervention upon the physiological parameters (a) resting heart rate (b) maximum oxygen intake (c) body weight.

Descriptive Statistics

A statistical profile of the Control and Experimental groups as they entered the study is contained in Table 2.

The smoking history data compare quite favourably with the results of a research report carried out for Health and Welfare Canada, *Smoking and Non-Smoking: A Study of Canadians' Behaviour and Attitudes*. (18) This study involved a stratified random sample which was designed to include 1,000 parents of children 0 - 18 years. The range of ages of the parents is similar to that found in the current study.

The age at which the smokers in the present study started smoking was 17.67 ± 2.5 years (Control) and 17.16 ± 2.98 years (Experimental). In the Health and Welfare Canada report, adults who were interviewed (smokers and ex-smokers)
### TABLE 2. STATISTICAL PROFILE

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>CONTROL</th>
<th>EXPERIMENTAL</th>
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<tbody>
<tr>
<td>N</td>
<td>18</td>
<td>18</td>
<td>-</td>
</tr>
<tr>
<td>SEX</td>
<td>13 female, 5 male</td>
<td>13 female, 5 male</td>
<td>-</td>
</tr>
<tr>
<td>AGE (YRS.)</td>
<td>37.67 ± 8.77</td>
<td>41.61 ± 7.59</td>
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<tr>
<td>RANGE (YRS.)</td>
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<td>27 - 50</td>
<td>-</td>
</tr>
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<td>17.16 ± 2.98</td>
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<tr>
<td>NUMBER OF YEARS SMOKED</td>
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<td>24.28 ± 7.59</td>
<td>1.69</td>
</tr>
<tr>
<td>NUMBER OF ATTEMPTS AT QUITTING</td>
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<td>3.00 ± 1.87</td>
<td>0.29</td>
</tr>
<tr>
<td>TIME SINCE LAST ATTEMPT AT QUITTING</td>
<td>34.23 ± 29.34</td>
<td>33.06 ± 31.43</td>
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<tr>
<td>INITIAL SMOKING SCORE (X OF SEVEN DAYS)</td>
<td>30.22 ± 13.10</td>
<td>34.61 ± 14.21</td>
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<tr>
<td>INITIAL BODY WEIGHT (KG.)</td>
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<td></td>
</tr>
<tr>
<td>MALES</td>
<td>70.12 ± 12.30</td>
<td>74.18 ± 5.35</td>
<td>0.76</td>
</tr>
<tr>
<td>FEMALES</td>
<td>60.73 ± 10.58</td>
<td>62.76 ± 6.45</td>
<td>0.57</td>
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<tr>
<td>INITIAL RESTING HEART RATE (BEATS/MIN.)</td>
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<tr>
<td>MALES</td>
<td>63.96 ± 9.34</td>
<td>72.78 ± 6.14</td>
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<tr>
<td>FEMALES</td>
<td>67.73 ± 12.96</td>
<td>67.91 ± 8.56</td>
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<tr>
<td>INITIAL MAXIMUM O₂ INTAKE (ML./KG./MIN.)</td>
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<td>MALES</td>
<td>32.16 ± 3.88</td>
<td>33.66 ± 6.76</td>
<td>0.48</td>
</tr>
<tr>
<td>FEMALES</td>
<td>29.66 ± 4.14</td>
<td>30.20 ± 5.44</td>
<td>0.30</td>
</tr>
<tr>
<td>INITIAL CO LEVEL (PPM.)</td>
<td>41.28 ± 14.65</td>
<td>41.00 ± 14.50</td>
<td>0.06</td>
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<tr>
<td>SELF MOTIVATION INVENTORY</td>
<td>135.06 ± 23.92</td>
<td>139.33 ± 26.19</td>
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N.B. In none of the above instances did the Control and Experimental group values differ significantly.
indicated that, on average, regular cigarette smoking started at age 16 with males tending to start at a slightly younger age (15 years) than females (17 years).

When the number of years smoked was examined the group means were 19.67 + 9.2 years (Control) and 24.28 + 7.59 years (Experimental). By comparison, in the Canadian government study, the mean values for smokers was 19 years and, for ex-smokers, 13 years.

In the Health and Welfare Canada study, those smoking parents who had tried to quit had done so 3.5 times. Although the largest single percentage (42%) of the ex-smoking parents had quit on the first attempt, those who were unsuccessful on the initial attempt were more likely to say that they had tried to quit two or more times before succeeding (36%) instead of once only before finally quitting (15%). As Table 1 indicates the data from the current study are quite similar, 2.77 + 2.46 previous attempts (Control) and 3.00 + 1.87 previous attempts (Experimental).

**Effectiveness of Intervention Strategy**

The effectiveness of the experimental treatment was analyzed in two ways. In the first, a two way analysis of variance with repeated measures on one factor was used (56). The factor in question was smoking behaviour score (the mean number of cigarettes smoked per day during the previous week).
The analysis was performed to test the significance of the difference in the means from $T_1$ to $T_5$.

The summary table for the analysis of variance is found in Table 3. No statistically significant difference was found between groups ($F = 0.357$, $p > .05$) but a highly significant $F$ value was found over time ($F = 54.99$, $p < .01$). The graphical representation of these data (Fig. 1) indicates that, although the intervention strategy did not bring about a significant difference between groups, the experimental group was able to achieve a lower smoking behaviour score (4.72) at the termination of the treatment ($T_2$) than did the control group (10.56) despite the fact that the experimental group's initial score was slightly higher. This difference was maintained at $T_3$ (8.61 for experimental, 14.44 for control), at $T_4$ (15.28 for experimental, 17.22 for control) and at $T_5$ (16.39 for experimental, 19.44 for control). The data in Fig. 1 demonstrate that the experimental group consistently had lower scores than the control group from $T_2$ to $T_5$ although never achieving statistical significance with the suggestion of a plateau occurring between $T_4$ and $T_5$ in the case of the experimental group.

In an attempt to identify where the significant differences existed between means over time, Duncan's Multiple Range Test was employed (13). As no significant differences
Fig. 1  EFFECT OF INTERVENTION STRATEGY ON SMOKING BEHAVIOUR SCORE
MEAN NUMBER OF CIGARETTES SMOKED PER DAY.
were found between groups, the group means were collapsed at $T_1$, $T_2$, $T_3$, $T_4$ and $T_5$ to form the data in Table 4. A sample calculation and step-by-step explanation of how the Duncan's Multiple Range Test summary Table was set up is contained in Appendix K. The data are found, in summary form, in Table 5.

The following statistically significant differences were of interest, $T_1 - T_2$, $T_2 - T_4$, $T_2 - T_5$, and $T_1 - T_5$. A significant reduction in smoking behaviour score occurred from the beginning to the end of the treatment period in both groups. Recidivism took place in both groups during the six month follow-up period so that there was a significant increase in smoking behaviour from the conclusion of the treatment ($T_2$) to the end of the three month follow-up period ($T_4$) and from the conclusion of the treatment ($T_2$) to the termination of the study ($T_5$). This level of smoking behaviour ($T_5$), however, was still significantly less than the initial smoking behaviour of both groups ($T_1$).

Smoking behaviour score tends to reflect merely the decrease or increase in the number of cigarettes consumed. Thus, a more rigorous test of the intervention strategy is the number of subjects who have actually quit smoking in each group. The second statistical technique used to test this aspect of the intervention program was chi square.
Smoking behaviour (those quitting versus those who did not quit) in both experimental and control groups was examined by chi square at the end of the treatment period ($T_2$), at the end of the one month follow-up period ($T_3$), at the end of the three month follow-up period ($T_4$) and at the end of the six month follow-up period ($T_5$). These data are graphically represented in Fig. 2.

The summary of the chi square analysis is contained in Appendix L. The experimental treatment did not effect a significant change in smoking behaviour at $T_2$ ($\chi^2 = 1.80, p > .05$), at $T_3$ ($\chi^2 = 1.80, p > .05$), at $T_4$ ($\chi^2 = 0.50, p > .05$) or at $T_5$ ($\chi^2 = 0.50, p > .05$). Once again, the experimental group had a consistently better performance record than the control group in terms of the number of smokers who quit from $T_2$ to $T_5$ but in none of the instances was the difference statistically significant.

In summary, neither of the statistical techniques used demonstrated that the intervention strategy was successful in bringing about a significant change in smoking behaviour using either the mean number of cigarettes smoked per day in each group or the number of those who quit smoking in each group.

These data are consistent with the results of studies conducted by Ilmarinen and Fardy (28) and Bonnano and Lies (3) who examined, over longer periods of time, the role of
Fig 2  EFFECT OF INTERVENTION STRATEGY ON SMOKING BEHAVIOUR—PERCENTAGE OF EACH GROUP WHO QUIT SMOKING.
physical activity in reducing the effect of coronary high risk factors such as body weight, serum cholesterol level, blood pressure and smoking behaviour. These studies, however, did not combine physical activity with a formal smoking cessation program as was the case in the current study.

The data do indicate, however, that there was an arithmetic difference between the two groups (using either measure of smoking behaviour) with the experimental group having a consistently better record from $T_2$ to $T_5$. This tends to support the findings particularly of Stamler et al. (49) who examined the management of long term coronary high risk factors such as hypercholesterolemia, hypertension, obesity, cigarette smoking and physical inactivity in male adults. The program developed by these authors did not contain organized and supervised exercise sessions but, instead, was limited to advice regarding the approach to be used in the development of a program of regular, moderate exercise. This, too, was one of the aims of the current study. Subjects in the experimental group were constantly encouraged (Appendix H) to get involved in a variety of forms of aerobic physical activity from walking up flights of stairs to bicycling.
Interaction of Various Factors With Quitting Behaviour

Time factors. In this section an examination is made of the influence of factors such as i) age started smoking ii) number of years smoked iii) length of time since the last attempt at quitting.

Analysis of variance was used to analyze age starting smoking scores with smoking behaviour (those quitting versus those who did not quit) and physical activity level (experimental group versus control group) as the independent variables. The analysis of variance was carried out at T₂, T₃, T₄ and T₅. A summary of these analyses is to be found in Table 6.

No statistically significant F values for main effects were found at any of the test times examined. A significant interaction effect, however, was discovered at both T₄ and T₅ (F = 6.304, p<.05). The data at these two test times are identical as the number of subjects who had quit smoking did not change from T₄ to T₅. The data are represented graphically in Fig.3.

Interpretation of the two way interaction leads to the conclusion that the intervention strategy was instrumental in assisting seven members of the experimental group to remain abstinent from cigarettes at the three and six month follow-up period. This occurred despite the fact that they had started smoking at an earlier age than any of the other
Fig. 3 ANALYSIS OF VARIANCE: AGE STARTED SMOKING SCORES WITH SMOKING BEHAVIOUR AND PHYSICAL ACTIVITY LEVEL AS INDEPENDENT VARIABLES
groups (16.14 years). By comparison, those members of the control group who were still not smoking at these two test times had started smoking almost four years later (19.80 years). Those members of both groups who were smoking at these test times had initially started smoking at ages somewhere between these two extremes, 16.85 years (control) and 17.82 years (experimental).

Analysis of variance was also used to examine the influence of the number of years smoked with smoking behaviour (those quitting versus those who did not quit) and physical activity level (experimental group versus control group) as the independent variables. Again, these analyses were carried out at T₂, T₃, T₄ and T₅ and a summary is to be found in Table 7. No statistically significant F values were discovered at any of the test times.

In similar fashion, analysis of variance was used to test the effect of the length of time elapsed since the subjects last attempted to quit. Again, no significant F values were discovered at any of the test times. A summary of the results is to be found in Table 8.

These data tend to refute the common belief that individuals who have smoked for a shorter period of time find it somewhat easier to quit. In fact, when the data are pooled, it is found that, at T₅, those who were still not smoking at that point had been smoking prior to the
treatment for 20.17 years compared with 22.87 years for those still smoking, a non-significant difference.

The interaction effect mentioned earlier indicates that the effect of exercise in this area is somewhat unclear and requires further study.

**Psychological factors.** As indicated earlier, the **Self Motivation Inventory** was used in an attempt to assess the degree to which individual differences in personality might influence quitting behaviour. The **Self Motivation Inventory** data were analyzed using analysis of variance with smoking behaviour (those quitting versus those who did not quit) and physical activity level (experimental group versus control group) as the independent variables. The analysis of variance was carried out at T_2, T_3, T_4 and T_5. A summary of these analyses is to be found in Table 9.

At T_2 a significant main effect was found associated with smoking behaviour (F = 12.79, p<.01); that is, those who had quit smoking by the end of the treatment period had a significantly lower **Self Motivation Inventory** score (126.45) than those who did not quit (150.63). A similar finding was noted at T_3 where, again, a significant main effect occurred associated with smoking behaviour (F = 10.737 p<.01). In this case, the **Self Motivation Inventory** scores were 124.56 for those who had quit and 147.30 for those who had not quit.
At T₄ and T₅ a similar main effect was found (F = 6.316, p<.05) and, again, those who had quit had the lower score, 123.67, as compared with 143.96 for those who had not quit.

These data are difficult to interpret as they are in direct contrast to what one would expect from a reading of the literature. That is, those who have a high level of self motivation have a higher score on this instrument. In the present study, individuals assumed to have the highest level of self motivation (i.e., they quit smoking) consistently held the lowest scores for self motivation.

It should be noted, however, that the Self Motivation Inventory was developed by Dishman et al. (11) in an attempt to measure personality factors which might separate "adherers" from "dropouts" in physical activity or physical fitness programs. It may be that the characteristics involved are specific to physical activity compliance and are not appropriate or germane to smoking cessation.

There is one other possible explanation. Dishman et al. (11) have drawn parallels between the construct of "self motivation" and the construct of "achievement motivation". Thus, they pointed out that "some individuals are much more inclined than others to persist at a task once the task has been initiated". (11:125) Given the massive amount of evidence available today linking cigarette
smoking with morbidity and mortality and the public sentiment against smoking, perhaps a high level of self motivation is necessary to persist in smoking.

Effect of Intervention Upon Physiological Parameters

Resting heart rate. In order to measure the short and long term effect of the intervention strategy on resting heart rate, the data were analyzed at $T_2$ and $T_5$ using analysis of variance. This involved both a $2 \times 2 \times 2$ and a $2 \times 2 \times 5$ analysis (those who quit versus those who did not quit, experimental group versus control group by a variable over time). A summary of the two analyses is to be found in Table 10.

At $T_2$ a significant "Time" effect was found ($F = 40.552$, $p<.01$) but, given the focus of this study, this is a meaningless statistic. (A significant "Time" effect indicates that if the resting heart rate data for all subjects were to be pooled, there would be a significant change from $T_1$ to $T_2$.) Significant "Time" values were ignored in the discussion of all analyses. No other significant $F$ values were identified at $T_2$.

At $T_5$ several significant $F$ values were noted, namely, a significant "Quit vs Did Not Quit" value ($F = 6.174$, $p<.05$), a significant "Time" value ($F = 35.344$, $p<.01$) and a significant 'A x D' (Quit vs Did Not Quit Over Time)
interaction ($F = 9.431, \ p < .01$).

The significant "Quit vs Did Not Quit" value indicates that, if time were to be ignored, those who quit smoking had a significantly lower resting heart rate value (59.10 beats per minute) than those who did not quit (67.92 beats per minute). When time is included, the statistically significant $A \times D$ (Quit vs Did Not Quit Over Time) interaction (Fig. 4) shows that quitting smoking over the period of the study and particularly during the follow-up period did bring about a consistent reduction in resting heart rate which did not occur with the group who did not quit. From $T_2$ to $T_5$ there is a distinct widening of the gap between the two groups.

These data support the findings in the research literature (2, 4) that smoking cessation brings about a reduction in resting heart rate. As the analyses did not reveal a significant difference in resting heart rate values between the experimental and control groups, the data are in conflict with the studies reported by Carlston and Grimby (6), de Vries (10) and Karpovitch (31) in which they discuss the classic reduction in resting heart rate which normally occurs as a result of aerobic training. In the current study it may be that the intensity of the physical activity was not high enough to establish a "training effect" or that the duration of the treatment (five weeks) was not sufficient
Fig 4  ANALYSIS OF VARIANCE RESTING HEART RATE (T1-T5) 'AXD' INTERACTION
to bring about the anticipated reduction in resting heart rate. The picture is also confused by the fact that there are two factors at work (smoking cessation and physical activity) which both tend to bring about a reduction in resting heart rate. The experimental intervention was obviously not powerful enough to bring about a noticeable difference between these two influences.

Maximum oxygen intake. In an attempt to determine if the experimental treatment had an effect on the subjects' level of aerobic fitness, the maximum oxygen intake data were analyzed using analysis of variance in the same manner as described for resting heart rate in the previous section. Once again, the analyses covered $T_1 - T_2$ and $T_1 - T_5$ and are summarized in Table 11.

When the $T_1 - T_2$ data were examined a number of significant F values were noted, namely, a significant "Quit vs Did Not Quit" effect ($F = 5.540, p<.05$), a significant "Time" effect ($F = 13.862, p<.01$) and a significant 'B x D' (Experimental vs Control Over Time) interaction effect ($F = 5.936, p<.05$).

The significant "Quit vs Did Not Quit" effect is an interesting finding as it indicates that if, once again, one excludes the time factor, those who quit smoking had a significantly higher maximum oxygen intake (32.97 ml.$O_2$/kg./min.) than those who did not quit (28.94 ml.$O_2$/kg./min.) at
the end of the treatment.

The impact of the experimental intervention strategy over time can be seen in the significant (Experimental vs Control Over Time) interaction (Fig. 5). Although the control group values changed little (30.52 ml./kg./min. to 30.90 ml./kg./min.) the experimental group values increased from 30.28 ml./kg./min. to 32.11 ml./kg./min.

A study of the $T_1 - T_5$ data uncovered several significant $F$ values, a significant "Time" effect ($F = 8.343$, $p<.01$), a significant (Quit vs Did Not Quit Over Time) interaction effect ($F = 2.545$, $p<.05$), a significant (Experimental vs Control Over Time) interaction effect ($F = 11.643$, $p<.01$) and a significant 'A x B x D' interaction ($F = 5.933$, $p<.01$).

During the period $T_1 - T_5$, the (Quit vs Did Not Quit Over Time) interaction indicates that the very act of stopping smoking can have a significant effect on one's capacity to perform aerobic work over time. The separation of the two groups (those who quit and those who did not quit) and the gradual widening of the gap between the two groups from $T_2 - T_5$ can be seen clearly in Fig. 6. A search of the literature has failed to uncover any research carried out on the effect of smoking cessation on aerobic capacity or maximum oxygen intake but if these findings can be substantiated it would provide further evidence of the
Fig 5: ANALYSIS OF VARIANCE MAXIMUM OXYGEN INTAKE ($T_1 - T_2$) 'BXD' INTERACTION
Fig 6  ANALYSIS OF VARIANCE MAXIMUM OXYGEN INTAKE (T1-T5)
'AXD' INTERACTION
beneficial effects of stopping smoking on the cardiorespiratory system.

The significant (Experimental vs Control Over Time) interaction (Fig. 7) gives graphic evidence of the impact of the intervention strategy on maximum oxygen intake over time. Whereas the control group values remained relatively constant, the experimental group values increased sharply from 31.12 ml./kg./min. to 33.09 ml./kg./min. \((T_1 - T_2)\) and gradually to 34.10 ml./kg./min. by \(T_5\). Again, the effect of the experimental treatment is seen in the gradual separation of the two groups from \(T_1 - T_5\). These data are in conflict to some degree with the heart rate findings discussed in the previous section. Normally, these two measures of aerobic fitness would show a somewhat similar pattern - as maximum oxygen intake values increase, resting heart rate values tend to decrease. It may be, however, that, as mentioned earlier, the effect of the experimental treatment on resting heart rate was clouded to some extent by the effect of quitting smoking on resting heart rate. It may also be that the effect of the intervention strategy was powerful enough to effect a change in maximum oxygen intake over time but not resting heart rate.

Perhaps, the most interesting finding in this area is the 'A x B x D' interaction shown in diagram form in Fig. 8. The effect of quitting smoking and the experimental treatment
Fig 7 ANALYSIS OF VARIANCE MAXIMUM OXYGEN INTAKE (T₁ - T₅) 'BXD' INTERACTION
Fig 8 ANALYSIS OF VARIANCE – MAXIMUM OXYGEN INTAKE (T₁ - T₅) ‘AXBXD’ INTERACTION
is demonstrated quite dramatically in a consistent increase over time in maximum oxygen intake. In contrast with this, those who were members of the experimental group but who had not quit smoking by the end of the study increased their maximum oxygen intake during the treatment period \( T_1 - T_2 \) but then the values levelled off and even dropped somewhat between \( T_4 \) and \( T_5 \). Both those who quit and those who did not quit smoking in the control group had little change in their maximum oxygen intake values over the course of the study. It is difficult to determine at this point whether the difference between those who quit and those who did not quit smoking in the control group was brought about by quitting smoking or, perhaps, those who quit were physically active more frequently, for longer periods of time, worked out at a higher level of intensity or chose different forms of physical activity.

**Body weight.** To test the effect, if any, of the intervention strategy on body weight the data were analyzed again using analysis of variance in the manner described in the previous two sections. Of interest were the parts of the study covered by \( T_1 - T_2 \) and \( T_1 - T_5 \). The analyses are summarized in Table 12.

Other than a significant "Time" effect \( (F = 11.66, p < .01) \), there were no other significant \( F \) values from \( T_1 - T_2 \). During the period \( T_1 - T_5 \) a significant "Time"
effect was noted ($F = 9.49, p<.01$) and a significant 'A x D' (Quit vs Did Not Quit Over Time) interaction was identified ($F = 2.96, p<.05$). The 'A x D' (Quit vs Did Not Quit Over Time) interaction is displayed in Fig. 9. As can be seen, little change in body weight took place over the course of the study with a suggestion of some separation of those quitting from those who did not quit from $T_4 - T_5$. These data are somewhat contrary to what one would find in the research literature.

Shephard et al. (47) found in their study that those quitting had an increase in body weight during the twelve month period following their study. In the current study those who, by the end of the study, had quit smoking started off the program at a lower body weight (61.36 kg.) than did those who did not quit (65.88 kg.). In addition, both groups, as part of the smoking cessation program (Appendix I) had received a great deal of information regarding weight control, low calorie foods, snacks, etc.).
Fig. 9 ANALYSIS OF VARIANCE—BODY WEIGHT (T₁–T₅)
'AXD' INTERACTION

- DID NOT QUIT
- QUIT
CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study was designed to assess the effect of a program of aerobic physical activity as an intervention strategy in smoking cessation. Thirty-six subjects were randomly assigned to two groups who both received a standard group counselling smoking cessation program. In addition, the experimental group was involved twice weekly in a program of aerobic exercise and was encouraged throughout the five weeks of the experimental treatment to participate in a wide variety of forms of physical activity.

A smoking history was obtained from each subject at the outset and an assessment of self motivation was derived using the Self Motivation Inventory. Body weight, predicted maximum oxygen intake, resting heart rate, carbon monoxide level and a smoking behaviour score were all recorded for each subject at the initial test (T1), at the post-treatment test (T2), one month following the end of the treatment (T3), three months after the termination of the treatment (T4), and at the conclusion of the study, six months from the end of the treatment (T5).

The data were analyzed by either analysis of variance or chi square in order to test (a) the effectiveness of the intervention strategy (b) the inter-relationship of various
factors with quitting behaviour and (c) the impact of the experimental treatment on resting heart rate, body weight and maximum oxygen intake.

Conclusions

Within the limitations of the present investigation, the following conclusions seem warranted.

1. The intervention strategy, although not achieving a statistically significant difference between the experimental and control groups over the course of the five week treatment period, was successful in bringing about a lower mean smoking behaviour score and a greater number of subjects abstinent from cigarette smoking in the experimental group at $T_2$.

2. The intervention strategy, although not successful in achieving a statistically significant difference between the experimental and control groups over the course of the six month follow-up period, did bring about consistently lower smoking behaviour scores in the experimental group and a higher percentage of those quitting in that group when compared with the control group from $T_2 - T_5$.

3. At the six month follow-up ($T_5$) when the data for all subjects was pooled, there had been a significant reduction in smoking behaviour when compared with $T_1$. 
4. None of the time factors (age started smoking, number of years smoked, length of time since the last attempt at quitting) was significantly related to smoking cessation behaviour.

5. The Self Motivation Inventory was of no value in predicting those who have a high probability of quitting smoking.

6. The intervention strategy was not effective in bringing about a significant difference in resting heart rate between the experimental and control groups but a significant difference was noted between those who quit smoking when compared with those who did not quit over the length of the study.

7. Both aerobic exercise and quitting smoking appear to bring about significant changes in maximum oxygen intake. The synergistic effect of the two influences was demonstrated.

8. The intervention strategy and/or quitting smoking had little if any effect on body weight.

Recommendations

The current study was a first essay into this area of smoking cessation research and it is recommended that further endeavours be mounted with the following provisions:
1. The experimental treatment be (a) of greater intensity (b) applied over a longer period of time (c) more strictly controlled.

2. An instrument be found or developed to identify those with a high probability of success in achieving smoking cessation.

3. A "true" control group be added to the study design. This will ensure that changes in smoking behaviour occurring in the population at large as a result of governmental or other agency health education programs will be controlled.

4. The number of males and females in each group be equal.
Appendix A

PAR-Q Questionnaire

The PAR-Q or the Physical Activity Readiness Questionnaire is a self-administered questionnaire which has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them. In essence, the purpose of PAR-Q is to assist test supervisors in determining who should and who should not be tested thereby ensuring the safety of participants. Subjects who answer YES to any question are not allowed to participate in the physical test. In such a case the individual should be referred to a physician for clearance before taking the test or engaging in an exercise program. Questions used in the questionnaire are as follows.

Yes No

( ) ( ) 1. Has your doctor ever said you have heart trouble?

( ) ( ) 2. Do you frequently have pains in your heart and chest?

( ) ( ) 3. Do you often feel faint or have spells of severe dizziness?

( ) ( ) 4. Has the doctor ever said your blood pressure was too high?

( ) ( ) 5. Has the doctor ever told you that you have a bone or joint problem such as arthritis that has been aggravated by exercise, or might be made worse by exercise?

( ) ( ) 6. Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to?

( ) ( ) 7. Are you over age 65 and not accustomed to vigorous exercise?
Appendix B

University of Western Ontario
Faculty of Physical Education

Smoking Cessation Research Study

Physician's Consent Form

To the family physician of ____________________.

Your patient has volunteered to act as a subject in a research study investigating the role of physical activity in cigarette smoking cessation. The study will involve the administration of a sub-maximal graduated bicycle ergometer physical fitness test in order to predict maximal work capacity.

The test involves pedalling at a predetermined speed and resistance for 3-4 minutes at each of 2-4 different workloads. Heart rate will be recorded at each workload. Due to the linear relationship between heart rate and workload, maximal work capacity can be estimated using the heart rate data obtained during the exercise test.

In addition, subjects will be encouraged to increase their level of physical activity for a period of five weeks. Subjects will be given instructions regarding increasing physical activity in a gradual, progressive manner. If necessary, further information regarding the research protocol can be obtained by contacting the undersigned.
If you consider that your patient is capable of participating in the above, I would appreciate you signing the form below in order to comply with University policy.

Sincerely yours,

J. Stanley Hill
Associate Professor
679-2445 (office)
471-8419 (home)

Date: ______________________

As far as I am aware, there is no medical reason why ____________________ should not participate in a graded submaximal bicycle ergometer physical fitness test or engage in a program of moderate, progressive physical activity.

_________________________
Physician

Comments:
Appendix C

DEMOGRAPHIC AND SMOKING HISTORY QUESTIONNAIRE

NAME ___________________________ SEX M F
ADDRESS ___________________________ CITY _____________
TELEPHONE: HOME _________________ POSTAL CODE _______
BUSINESS _________________ AGE _______

SMOKING HISTORY
How many cigarettes are you currently smoking per day? ___
What brand do you normally smoke? _______________________
At what age did you start smoking regularly? _____________
For how many years have you been consistently smoking? ___
Have you attempted seriously to quit before? Yes No
If Yes, how many times: ______
How much time has elapsed since you last tried to quit? ___
Why did you start up again the last time? ________________

What is your reason for wanting to quit this time? ______

___________________________________________________________

___________________________________________________________

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Appendix D

The University of Western Ontario
Faculty of Physical Education

SMOKING CESSATION
STUDY

Data Collection    T_1  T_2  T_3  T_4  T_5  Date _________

Name ___________________________ Age _________ yrs.
Body Weight ______ lbs. ______ kg.
Estimated maximal heart rate (220 - age) _______
Test termination (Max HR - 15) _______

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78
Appendix D (continued)

<table>
<thead>
<tr>
<th>Work Load (kgm./min.)</th>
<th>Heart Rate (beats/min.)</th>
<th>Predicted Max. VO₂ (lit./min.) (ml./kg./min.)</th>
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Appendix E

Submaximal multi-stage bicycle ergometer test protocol

Maximum oxygen intake was predicted from data gathered from the following continuous, multi-stage submaximal bicycle ergometer test.

The bicycle ergometer saddle height was adjusted for each subject in order that there be a slight bend of the knee joint with the ball of the foot on the pedal and the pedal at the bottom of the down stroke. During this test the subjects were required to maintain a pedalling cadence of 50 revolutions per minute. To assist them in achieving this the subjects were asked to keep time with a metronome and to check their performance against a pedalling cadence dial.

Heart rate was measured by means of electrocardiographic tracings. Three electrodes were attached to the skin by means of adhesive collars and positioned as follows:-(a) at the top of the sternum (b) at the foot of the sternum (c) at the left lateral side of the eighth rib. The electrode leads were attached by patient cable to the ECG recorder.

The test consisted of a series of three minute work bouts which progressed higher in work load at a rate dictated by the subject's heart rate response. After a one minute warm-up at zero work load which allowed the
subject to adjust to the pedalling rhythm, the test proper began with the bicycle ergometer work load set at 300 kilopond metres per minute. Each work load setting lasted a minimum of three minutes with heart rate measured during the last fifteen seconds of each minute. The heart rate data was recorded on a specially designed form (Appendix D). If the heart rates at the end of the second and third minutes were within five beats of each other the work load was increased. If not, the current work load was continued for another minute or until a heart rate plateau was reached.

The heart rate value at the end of the first work load period was used to determine the level of the next work load. Generally speaking, if the heart rate was less than 90 beats per minute, the next work load was set at 900 kilopond meters per minute. If the heart rate was between 90 and 105 beats per minute, the next work load was set at 750 kilopond meters per minute. If the heart rate was greater than 105 beats per minute, the next work load was set at 600 kilopond meters per minute. This approach was adjusted downward somewhat for female subjects, older subjects and for subjects who indicated that they had been physically inactive for a lengthy period of time.

The same procedure was then repeated at the second work load level. Using a similar approach a third work
Appendix E (continued)

load level was established. In this way, three heart rates elicited by three different work loads were recorded.

As the basic assumption of this test is that heart rate and oxygen intake are both linear functions of work rate, an estimation of maximum oxygen intake can now be made using the approach schematically shown in Appendix F.

Using the formula maximum heart rate = 220 - age, a maximum heart rate line was drawn horizontally across the top of the graph paper. The three heart rate values were plotted and a line drawn through them which intersected with the maximum heart rate line. A vertical line drawn downwards indicated the maximal oxygen intake value in litres per minute.
Appendix F

EXAMPLE OF PREDICTED MAXIMUM OXYGEN INTAKE DETERMINATION

MAXIMUM HEART RATE = 220 - Age

= 220 - 31

= 189

BODY WEIGHT 60.8 kg.

PREDICTED MAXIMUM OXYGEN INTAKE = 3.30 lit./min.

= 54.27 ml./kg./min.

KPM/ MIN

MAX 0.9 1.2 1.5 1.8 2.1 2.4 2.8 3.2 3.5 3.8 4.2 4.6 5.0

$VO_2$ 

(LIT./MIN.)
Appendix G

SELF MOTIVATION INVENTORY
Appendix G

SELF MOTIVATION INVENTORY

Read each of the following statements and write by each item the letter of the alternatives which best describes how characteristic the statement is when applied to you. The alternatives are:

a) extremely uncharacteristic of me  
b) somewhat uncharacteristic of me  
c) neither characteristic nor uncharacteristic of me  
d) somewhat characteristic of me  
e) extremely characteristic of me

Please be sure to answer every item and try to be as honest and accurate as possible in your responses. Your answers will be kept in the strictest confidence.

1. I'm not very good at committing myself to do things.

2. Whenever I get bored with projects I start, I drop them to do something else.

3. I can persevere at stressful tasks, even when they are physically tiring or painful.

4. If something gets to be too much of an effort to do, I'm likely to just forget it.

5. I'm really concerned about developing and maintaining self-discipline.

6. I'm good at keeping promises, especially the ones I make to myself.

7. I don't work any harder than I have to.

8. I seldom work to my full capacity.

9. I'm just not the goal-setting type.

10. When I take on a difficult job, I make a point of sticking with it until it's completed.

Be sure to complete the items on the next page.
Appendix G (continued)

SELF MOTIVATION INVENTORY (continued)

11. I'm willing to work for things I want as long as it's not a big hassle for me.
12. I have a lot of self-motivation.
13. I'm good at making decisions and standing by them.
14. I generally take the path of least resistance.
15. I get discouraged easily.
16. If I tell somebody I'll do something, you can depend on it being done.
17. I don't like to overextend myself.
18. I'm basically lazy.
19. I have a very hard-driving, aggressive personality.
20. I work harder than most of my friends.
21. I can persist in spite of pain or discomfort.
22. I like to set goals and work toward them.
23. Sometimes I push myself harder than I should.
24. I tend to be overly apathetic.
25. I seldom if ever let myself down.
26. I'm not very reliable.
27. I like to take on jobs that challenge me.
28. I change my mind about things quite easily.
29. I have a lot of will power.
30. I'm not likely to put myself out if I don't have to.
31. Things just don't matter much to me.
32. I avoid stressful situations.

Be sure to complete the items on the next page
Appendix G (continued)

**SELF MOTIVATION INVENTORY (continued)**

33. I often work to the point of exhaustion.

34. I don't impose much structure on my activities.

35. I never force myself to do things I don't feel like doing.

36. It takes a lot to get me going.

37. Whenever I reach a goal, I set a higher one.

38. I can persist in spite of failure.

39. I have a strong desire to achieve.

40. I don't have much self-discipline.
Appendix H

Aerobic Training Program

Twice weekly, for five weeks, the members of the Treatment Group will, following the group counselling component of the program, engage in approximately thirty minutes of aerobic exercise as follows:-

1. Each session will start off with four to eight minutes of flexibility-type stretching exercises as a warm-up.

2. Following this the participants will be introduced to a number of variations on the interval training (walk/job) theme. Interval training is operationally defined as periods of training/exercise/work interspersed by periods of relative rest. The interval training in this instance will consist of periods of easy jogging interspersed by periods of walking. These sessions will take place on the Stadium track or on the jogging trails around the University of Western Ontario. From time to time the instructor will call a rest period and use this time for a brief talk on such topics as other types of aerobic exercise, frequency, intensity and duration of exercise, appropriate clothing and footwear, etc.

3. Participants will be encouraged to engage in physical activity at other times during the week - when they feel like a cigarette they should walk around the
block, go for a bicycle ride, run on the spot in the basement; if at the office, walk up and down a flight of stairs, walk around the block or around a neighbourhood park. Generally, the Treatment Group will be encouraged to be as active as possible, at different times each day, for the duration of the treatment period.

**N.B.** The role of physical activity in smoking cessation will be downplayed with the Comparison Group.
Appendix I

OPERATION KICKIT
LONDON AND MIDDLESEX LUNG ASSOCIATION
SMOKING CESSATION - GROUP COUNSELLING

ATTENDANCE CARD

<table>
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<tr>
<th>Session</th>
<th>Date</th>
<th>Cigs. smoked per day since last meeting</th>
<th>How do you feel about quitting? Right now! (see list below)</th>
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Tenacious  Nervous  Positive  Guilty  Skeptical
Tense      Confident Negative  Eager  Fearful
Uneasy     Upset      Excited  Despondent  Good
Wonderful   Happy      Cheerful Proud  Inspired
Worried     Depressed Miserable Relaxed  Sure
Adamant     Anxious    Mean    Sad    Tempted
Meeting #1
Instruction Sheet

Welcome to the first session!
The next few weeks should prove very interesting because:
   a) You will learn about your smoking habits;
   b) You will become acquainted with the other people in your group;
   c) You will be climbing the ladder of success to your goal of becoming a non-smoker.

A FEW GROUND RULES:
1) You have a right to express your ideas.
2) You can and should ask any questions that come to mind. In other words, be spontaneous.
3) You have a responsibility to attend regularly.
4) You should be ready and willing to encourage the other people in the group.
5) Read all materials thoroughly, and follow the instructions (your success depends on it).
6) Try to avoid getting sidetracked. The purpose of this group is to stop smoking – you can talk about the game or the kids or exchange recipes after the meeting.

WEEK'S PROJECT
Because smoking is basically a social habit, DO NOT offer a cigarette to anyone, DO NOT accept a cigarette from anyone, and DO NOT light a cigarette for another person.

RATING CHART:
Record only the time of lighting up each cigarette.
HELPFUL HINTS

1) As your taste buds perk up you will require less seasoning.

2) Decrease the amount of sugar you use in tea and coffee. It causes weight gain and increases your craving to smoke.

3) Why not start a PIGGY BANK. Either daily or weekly, calculate the amount you save by smoking less. This money should be earmarked for special things like a holiday, dining out, hobbies, new wardrobe, etc.

4) Take a multiple vitamin tablet daily, or increase your intake of raw fresh fruits and vegetables. A diet high in protein should also be part of your new self improvement plan.

5) Start thinking about an exercise program or a sport that you could take up to help tone, trim and relax you. Walking is a good exercise, as is yoga, swimming, etc. It is important that you choose a recreation that you enjoy, or it may become more of a punishment than a pleasure.

6) Soon you will have more time, so why not bring out all your old neglected hobbies. All time fillers should be considered as a BONUS, after all, you are quitting smoking and deserve time to enjoy yourself.

Few things are accomplished without a reason.

Everyone has some reasons why they like to smoke as well as good reasons why they should stop.

I LIKE TO SMOKE BECAUSE:  I WOULD LIKE TO STOP BECAUSE:
**STRESS FACTORS**

To assess your present stress level, record points from those events that have affected you during the last 12 months, then total.

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<th>Event</th>
<th>Points</th>
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<td>Divorce</td>
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<td>Marital separation</td>
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<tr>
<td>Death of close family member</td>
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<td>Detention in jail</td>
<td>62</td>
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<tr>
<td>Personal injury, surgery or illness</td>
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<td>Marriage</td>
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<td>Being fired from work</td>
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<td>Retirement from work</td>
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<td>Marital reconciliation</td>
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<td>Change in health of family</td>
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<td>Change in behaviour of family</td>
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<td>Pregnancy</td>
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<td>Major business readjustment</td>
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<td>Sexual difficulties</td>
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<td>Change in financial status</td>
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<td>Death of a close friend</td>
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<td>Change in line of work</td>
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<td>Change in number of arguments with spouse</td>
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<td>Mortgage or loan greater than $10,000</td>
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<td>Foreclosure of mortgage</td>
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<td>New family member</td>
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<td>Son or daughter leaves home</td>
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<td>In-law troubles</td>
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<td>Change in responsibilities at work</td>
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<td>Outstanding personal achievement</td>
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<td>Beginning or ceasing formal school</td>
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<td>Wife begins or ceases work</td>
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<td>Change in living conditions</td>
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<td>Change in personal habits</td>
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<td>Trouble with boss</td>
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<td>Change in working hours</td>
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TOTAL
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Meeting #2

Instruction Sheet

Hi, hope you had a great week. Are you surprised to find how many cigarettes you have been smoking in a robot fashion?

To be able to tell the group about your progress, using your rating chart, add the last seven days and divide by seven -- this will give you an average of how many cigarettes you have smoked. We will be interested in learning how many cigarettes you smoked (prior to last week) and how many you are smoking now, as well as what was your best day.

Of course we will want to hear about any comments you received regarding your rating form and how your family feels about what you are doing, etc.

Next week will be a chance to really feel that progress is the "name of the game."

WEEK'S PROJECT

In addition to smoking fewer cigarettes, you will be required to choose one meal of the day and NOT smoke for thirty minutes after it -- after all we are unlearning our habits, remember, this will not be easy at first -- but is a great confidence builder. A thirty minute eating binge does not count. You want thirty foodless, smokeless minutes.

Here are some tips to help make it easier:

- Leave the table right after you finish your meal.
- Take your beverage to another room and read instead of smoking (pick something interesting).
- Brush your teeth and use dental floss or toothpicks.
- Rinse your mouth with salt water (or soda or mouth wash).
- Go for a walk.
- Chew sugarless gum.
WEEK'S PROJECT (continued)

- Go directly to your new hobby and forget cigarettes altogether.
- Read your list of reasons for wanting to succeed in stopping.
- Visit a nonsmoking friend.
- Go to a library.

RATING CHART

This week record time of each cigarette plus activity (working, watching T.V. etc.).

Next week bring an advertisement of your favourite brand of cigarettes.

HELPFUL HINTS

Try not to nibble, it is better to have one delicious dessert once a day, as a reward rather than munching numerous eatables all day. Drink unsweetened fruit juices -- grapefruit and tomato juice are especially good.

Every time you do not smoke, give yourself a verbal pat on the back -- "Well done."

Have you eliminated sugar in your tea and coffee? Try making a different brand of coffee or using an artificial sweetener.

Be proud of yourself -- you are making a wise choice.

IDEAS FOR SMOKERS WHO ARE TRYING TO QUIT

Quitting smoking means weight gain only if one consumes more food or more calories.

Here are some suggestions to keep you from feeling deprived:

- Raw vegetables, broccoli, green beans, cucumber, green pepper strips, cauliflower, mushrooms, carrots, celery, radishes, cherry tomatoes. (Keep a cut, ready supply in the refrigerator).
IDEAS FOR SMOKERS WHO ARE TRYING TO QUIT (continued)

- Low-fat cottage cheese dip (add onion or garlic powder: use with raw vegetables or crackers).

- Tomato or V-8 juice.

- Dill pickles, sour pickles.

- Fresh fruit, especially cantaloupe, strawberries, grapefruit, oranges, tangerines (high in Vitamin C).

- Low calorie gelatin dessert.

- Sugarless mints or gum.

- Skim milk.

- Crackers: rye krisp, wheat wafers: Puffed wheat or puffed rice, all a good source of Vitamin B. Home made popcorn, without added salt or fat. Unshelled peanuts - these keep your hands busy as well as requiring a great deal of chewing.

- Cold water (with ice) - use a fat straw.

- Hot toothpicks.

- Cinnamon sticks.

- Whole cloves.

- Bits of orange or lemon peel.

Remember that each package of cigarettes creates as much wear and tear on your body as carrying 65 extra pounds of fat.
<table>
<thead>
<tr>
<th>HABIT LIST</th>
<th>NUMBER OF CIGARETTES</th>
</tr>
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<tbody>
<tr>
<td>ENTER THE DAILY AVERAGE NUMBER OF CIGARETTES REPRESENTED BY EACH HABIT</td>
<td></td>
</tr>
<tr>
<td>WAKE-UP CIGARETTE</td>
<td></td>
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<tr>
<td>AFTER BREAKFAST</td>
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<tr>
<td>WHILE DRIVING</td>
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<td>WHILE WALKING ON THE STREET</td>
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<td>WHILE ON THE TELEPHONE</td>
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<td>WHEN TALKING TO SOMEONE</td>
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<td>AT SCHEDULED WORK BREAKS</td>
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<td>BEFORE LUNCH</td>
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<td>AFTER LUNCH</td>
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<td>AFTER SHOPPING IN A PUBLIC STORE</td>
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<td>IN THE BATHROOM</td>
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<td>WHILE WAITING</td>
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<td>MID-AFTERNOON</td>
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<td>AFTER ACCOMPLISHING SOME TASK</td>
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<td>AFTER PARTICIPATING IN SOME SPORT</td>
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<td>COCKTAILS OR DRINKS</td>
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<td>WHILE WATCHING T.V.</td>
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<td>BEFORE DINNER</td>
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<td>AFTER DINNER</td>
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<tr>
<td>DURING EXCITING MOMENTS</td>
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<tr>
<td>WHILE BEING A SPECTATOR TO SPORTS, MOVIES, ETC.</td>
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<tr>
<td>WHILE READING</td>
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<tr>
<td>WITH NIGHTCAP OR SNACK</td>
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<td>AFTER SEX</td>
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<tr>
<td>WITH INSOMNIA</td>
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<tr>
<td>WHEN IN MEETINGS, CONFERENCES, ETC.</td>
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<tr>
<td>GETTING STARTED (WORK, WRITING, TASK)</td>
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<tr>
<td>OTHERS:</td>
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</tbody>
</table>
Meeting #3

Instruction Sheet

Hi, are you starting to feel the crunch? If your moods have escalated lately do not be surprised. Your misgivings are normal -- in fact, necessary, and your pride and pleasure is earned. There will be many times when you will feel very discouraged -- please don't give up.

Today we will be discussing how you made out in your thirty minutes of nonsmoking after a meal, and how much you averaged on a daily basis as well as any changes you have noticed in how you feel. Are you breathing easier? Coughing less?

Keep as optimistic as possible, remembering that stopping is the end of something that has controlled you for years and your success in quitting means the start of a happier, healthier, free existence. You won't have to smoke. You can relax, and live, and living is breathing.

WEEK'S PROJECT

This week's project is three hours of NOT smoking. Pick any three hours of a day, choose the easiest time and fill those hours with other activities. The first three days will not be easy but after that you may find yourself forgetting about cigarettes completely. If you cannot complete three hours the first time you try, plan two smokeless hours and add ten minutes each day.

Set aside a nonsmoking room in your home. This room will become a haven, it will be cleaner and fresher and in a few weeks the association of smoking in that room will be eliminated. Keep this room clean, fresh and tidy. Think of it as your nonsmoking retreat.

Read your "list of reasons for quitting" every day.

Start to visualize yourself as a nonsmoker.

RATING CHART

This week record your "feelings" at the time of lighting up and after you put the cigarette out -- i.e. tired, bored, angry, etc.
HELPFUL HINTS

Start finding new rewards for yourself:

- take a nap
- go for a walk
- buy a new magazine
- play a favourite record
- exercise
- ride your bike
- enjoy a hobby
- go to a park
dine out
do a jig saw puzzle
do a crossword puzzle
paint by number
plan a new wardrobe
plan a holiday

Although most people think they smoke to relax, in actual fact smoking is in three categories.

1. Chemical need (a few cigarettes every day keep the "jitters" away) -- or basic need cigarette.
2. Habit or taste cigarettes -- with coffee -- after meals, etc.
3. Emotional smoking -- or "feelings" cigarettes, those associated or triggered by -- anger, boredom, excitement, etc. This week, you can start to learn about your feelings.

Rewards of keeping to quota: this could be just a 15 minute break to enjoy a favourite record -- take the phone off the hook. Do whatever else makes you feel that you are indulging yourself.

Drink lots of water -- iced with a straw is great while reading, watching TV, playing cards, etc.

Start to study people who do not smoke -- what do they do with their hands? How do they cope with daily situations? Do they look relaxed and comfortable without a cigarette? Will you enjoy looking like that too?
FEELINGS THAT PEOPLE EXPERIENCE

There is nothing wrong with experiencing any of the following feelings. Feelings are normal and natural. People are entitled to a wide range of emotional responses. Learn to recognize your feelings and appreciate them.

Adequate  Eager  Low  Stingy
Adamant  Ecstatic  Lustful  Strange
Affectionate  Electrified  Mad  Stupid
Agony  Enchanged  Mean  Suffering
Almighty  Energetic  Melancholy  Sure
Angry  Enjoyment  Miserable  Sympathetic
Annoyed  Envious  Naughty  Tempted
Anxious  Excited  Nervous  Tenacious
Apathetic  Evil  Nice  Tenuous
Astounded  Exasperated  Obnoxious  Tense
Bad  Fascinated  Obsessed  Tentative
Beautiful  Fearful  Opposed  Terrified
Bitter  Flustered  Outraged  Thwarted
Bold  Foolish  Pain  Trapped
Bored  Frantic  Panicked  Troubled
Brave  Frustrated  Persecuted  Unsettled
Calm  Frightened  Petrified  Violent
Capable  Free  Pity  Vehement
Captivated  Good  Pleasant  Vital
Challenged  Gratified  Pleased  Vulnerable
Cheated  Greedy  Pressured  Wicked
Cheerful  Grief  Preferred  Wonderful
Clever  Guilty  Pretty  Worried
Combative  Happy  Proud  Worry
Competitive  Hate  Quarrelsome
Condemned  Helpless  Rage
Confused  High  Rapture
Conspicuous  Honored  Rejected
Contented  Horrible  Relaxed
Cruel  Hurt  Remorse
Crushed  Ignored  Restless
Deceitful  Infatuated  Rewarded
Defeated  Inspired  Sad
Delighted  Intimidated  Satisfied
Desirous  Jealousy  Scared
Despair  Joyous  Servile
Determined  Jumpy  Settled
Different  Kind  Sexy
Diminished  Keen  Shocked
Discontented  Lazy  Silly
Distracted  Lecherous  Skeptical
Disturbed  Lonely  Solemn
Dominated  Longing  Sorrowful
Divided  Loving (love)  Spiteful

Your feelings are harmless to others unless they result in an act. Living is feeling. Try to come to know yourself better through your feelings.
Meeting #4

Instruction Sheet

Are you beginning to feel like a part-time non-smoker?

A telephone partner could be useful. Would you like one? Is there someone in the group you would like to have as a daily contact? This person should not be a relative, friend or neighbour. Pick someone you have met here in the group.

Do not forget to use your deep breathing to relax. It is helpful while driving, waiting in a meeting and especially when one is angry or upset.

Continue to not smoke for 30 minutes after the same meal and maintain the three hour NON SMOKING period.

WEEK'S PROJECT

This week you will be asked to smoke one cigarette daily in front of a mirror. There is a good reason for this. Consider that a one pack a day smoker goes through the act of smoking (puffing) about 250 times EVERY DAY. Is it any wonder that smokers develop an extra set of wrinkles. Also you can start to see your role as a smoker in its true perspective.

For contrast, every day look at yourself in the mirror without a cigarette. Which is the real you? The world can see you either way -- puffing or not -- you cannot do both at the same time. Do you really like the smoker? Does the non-smoker like you?

This week, as you re-arrange your ingrained habits, be sure to consult the chart as to brands for switching. Keep the change of colour and style of package in mind while shopping.

RELAXATION TECHNIQUES

Exercise is relaxing, in fact, the best way to relax a muscle is to tense it up first, then "let go." Do this with your hands -- make a fist, hold it, now "let go" -- see how relaxed your hand feels. This same principle is effective for your whole body -- it also relieves emotional tension. Learn to relax voluntarily.
RATING CHART

When recording each cigarette, try to evaluate moods, activities, etc. in as much detail as possible, i.e. time, who you are with, or what you are doing, how much you need the cigarette, how you feel both before lighting up and after putting the cigarette out.

Smoking Urges - Using the following "urge rating scale" evaluate your feelings before each cigarette. Enter the number alongside the time on the Cigarette Score Card each day.

I want a cigarette..... 1) a little ("not really at all") 2) somewhat ("perhaps") 3) a moderate amount ("vague desire") 4) quite a bit ("need") 5) very much ("craving").

HELPFUL HINTS

When you socialize, start to look at the smokers and pretend you no longer smoke. In other words, pretend you are the nonsmoker (at a party, banquet or bowling). Even for one hour this is good practice.

Soon you will enjoy the exhilarated feeling that goes with an increased oxygen supply which is a direct result of physical exercise. Continue to make smoking an unusual experience. Use the other hand, other fingers, change brands daily, etc.

These are your "exercise tips" for relaxation:

- sit ups
- push ups
- deep knee bends
- twists
- running on the spot
- ride a bike (real or stationary)
- stretching
- walking

Clear your home of ashtrays, as they act as "triggers," reminding you to smoke. Store a few for company but keep them out of sight.
LIST OF POSSIBLE NEEDS

Need for identification
Need for conformity
Need for social approval
Need for personal interest
Need for variety
Need for freedom
Need for power
Need for success
Need for health
Need for privacy
Need to play
Need for distinctiveness
Need for self-realization
Need for convenience
Need for order
Need for welfare of loved ones
Need to attract the opposite sex
Need for recognition
Need to imitate or emulate
Need for achievement
Need to acquire possessions
Need for affiliation
Need for autonomy
Need to explore & to seek knowledge
Need to collect and preserve things
Need to organize and build
Need to act differently from others
Need to defend and justify one's actions
Need for exhibition to attract attention
Need to give information, explain, interpret
Need to seek aid, protection or sympathy
Need for pleasure
Need for entertainment
Need for affection
Need for comfort
Need for newness
Need for prestige
Need for creativeness
Need for adventure
Need to avoid failure
Need to save things
IDENTIFYING INGRAINED HABITS LINKED WITH
THE SMOKING HABIT

<table>
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<tr>
<th>WHAT I DO</th>
<th>ALTERNATIVES</th>
<th>RESULTS</th>
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<tbody>
<tr>
<td>Where I buy my cigarette supplies</td>
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<tr>
<td>Type of package &amp; colour of package</td>
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<tr>
<td>How I light up and hold my smoking materials</td>
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<tr>
<td>People I smoke with regularly</td>
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<tr>
<td>Favourite spots re: chair or area in home and office</td>
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<tr>
<td>Ashtrays &amp; Souvenirs</td>
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</tbody>
</table>
Meeting #5

Instruction Sheet

WHO said it was easy to quit smoking?

We all know it is very difficult—but worthwhile, just ask someone who has succeeded. HOW GOOD THEY FEEL ABOUT THEMSELVES. Continue to make smoking an unusual experience. Use the other hand, other fingers, change brands daily, etc.

If for any reason you feel the choice of a telephone partner was not beneficial or turned out to be a mismatch, please let your counsellor know. Perhaps another phone buddy would be more helpful.

WEEK'S PROJECT

This week you will be asked to eliminate the first cigarette of the day. For many, this is the wake up cigarette. This is a necessary step in preparing for total cessation.

Take time to rewrite your lists of reasons for quitting.

RATING CHART

This is a good time to feel you are in control of your smoking. On the top of the rating chart write "Do I really need this cigarette?" Ask yourself and see if you can wait five, ten or fifteen more minutes before lighting up.

HELPFUL HINTS

Start a new policy of not smoking in your bedroom. Have the bedding cleaned or aired, clean the drapes and carpets and use an air freshener. You will soon appreciate the clean freshness of this one area and it will contribute to a better sleep and "fresher" start in the morning.

It is easier to NOT smoke if one has a shower, followed by a glass of grapefruit juice, or tomato juice, or whatever you prefer. This combination will drown your nicotine hangover. Plan your morning attack before retiring. Put your cigarettes in the basement or leave them in your car at night.
HELPFUL HINTS (continued)

Start to change your method of lighting cigarettes so you will be constantly reminded of changing your smoking complex. For example, use wooden matches to remind you to hold the cigarette in the other hand, use a sardine can for an ashtray, etc.

This could be a good time to start eating breakfast. After all that is the one meal that does not add surplus pounds and does improve your energy level.

POSITIVE THINKING

STOP SMOKING - START LIVING

Since the human mind can only hold one thought at a time, it does not make much sense to hold an ugly, negative thought when one could be thinking a positive or beautiful thought.

As a nonsmoker you are moving out of the clouds into the sunlight. In order to enjoy your new freedom, here is a collection of thoughts and ideas you may find helpful.

A healthy body is essential to the enjoyment of life. One owes oneself the respect and consideration that it deserves (in this case quitters are winners).

A person's life can be likened to a plot of ground: if you sow and cultivate flowers, that is what will grow in the soil, but if you let it go and ignore it completely, it will likely become overgrown with weeds. It is conceivable you could also grow poisonous plants or nettles, it is your choice. (The same thing applies to every person's thoughts and life). What is growing in your garden?

New habits are like a new skill, practiced often they become second nature. You have a new habit -- a habit of Not Smoking.

A LITTLE ENCOURAGEMENT

In the U.S.A. two million people stop smoking every year. We don't have accurate Canadian Statistics, but it is estimated that 200,000 people stop smoking every year in Canada.
A LITTLE ENCOURAGEMENT (continued)

The high cost of cigarettes can only increase as the cost of living goes up. By not smoking you have an "income tax free" extra $300.00 every year -- based on one package per day -- of course many people smoke more. Five years of not smoking or $2,100.00 could provide a great holiday, near new car, sail boat or ??? What treats can you think of? Maybe you would rather help a crippled child or donate the savings to research or???

Thousands of people wish they had not started to smoke. Every day thousands of people try to stop smoking.

You have achieved a much desired status. By becoming a nonsmoker you are the envy of many and you should try to remember that thousands of people trying to stop wish they too were no longer smoking.
This relaxation exercise combines elements from several techniques. Those of you who have used Yoga will recognize "The Sponge." If anyone is familiar with "Autogenic Training" there are elements from it. A third element is from a technique called "Metronome Conditioned Relaxation." Each of these techniques can be used alone with great effectiveness and the point is to find something which works for you.

The following exercise is useful in that the ultimate goal is to condition yourself to respond to one word and thus experience a relaxed state wherever you are; at work, at play, whether other people are around or not. It is not something for which you need privacy or space and thus it's usefulness is greatly extended.

There are three phases to the conditioning process: the first phase is to learn what true relaxation feels like (many people think they know, but find they don't really); the second phase is to practice the relaxation and heighten it, and to establish the connection between feeling relaxed and certain words; the third phase practicing the instant method of inducing relaxation. Each phase should be practiced for about a week, at least once daily, preferably twice, at a time convenient to you. Just before going to sleep at night is convenient for many people. It is useful during the first phase to lie down; during the second phase to practice sitting in a chair and the 3rd phase may be practised anywhere.

**PHASE 1**

1. Get into a comfortable position lying down, preferably on your back.

2. Beginning with the right foot and lower leg, tense your muscles just as much as you can; the more you tense your muscles the more you will experience the relaxation when you release. Proceed with the left foot and lower leg and continue to the thighs and hips. Feel the heaviness.

3. Continue to the stomach and abdomen -- tense and then release. Feel the warmth.

4. Proceed to your right hand and arm -- tense and relax. Allow yourself to feel the change and experience the feeling of release and relaxation.
PHASE 1 (continued)

5. Continue with your left hand and arm -- tense then release -- feel the heaviness.

6. Move on to your neck -- tense -- release -- feel the difference.

7. Lastly, as much as you can, tense and release the muscles of your face and scalp so that from top to toe you experience the warmth, the heaviness, the peace of complete relaxation.

8. While you are practicing, think of yourself:

"I am at peace"  "My arms and legs are heavy"
"Relax, let go"  "My body is warm and heavy"

SKIPPING BREAKFAST COULD MAKE YOU FAT

SOUND STRANGE? Not according to Frances McAfee, nutritionist at Group Health Cooperative.

WHY IS BREAKFAST SO IMPORTANT? Because you need food to fuel all your morning activities. If you don't eat breakfast, you blood sugar and energy level are low after a long night with no food. Many non-breakfast eaters can't resist an overwhelming desire for a sweet roll at mid-morning. It may satisfy the hunger, but it doesn't supply the nutrition a body needs at the beginning of the day.

WHAT IS A MINIMUM BREAKFAST THAT SUPPLIES ENOUGH NUTRITION?

<table>
<thead>
<tr>
<th>Breakfast #1</th>
<th>Breakfast #2</th>
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</thead>
<tbody>
<tr>
<td>Fruit or juice</td>
<td>Juice of fruit</td>
</tr>
<tr>
<td>One egg</td>
<td>Whole grain cereal</td>
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<tr>
<td>One slice of whole grain bread</td>
<td>Milk (can be skim)</td>
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<tr>
<td>or a serving of cereal</td>
<td></td>
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<tr>
<td>Milk (can be skim)</td>
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</tbody>
</table>
PHASE 1 (continued)

Both of these breakfasts offer solid food value, nutritional balance and enough calories to power a morning's work. Yet the calories are low enough to fit into a reducing diet of 1,000 calories a day. The juice or fruit supplies Vitamin C. The egg and milk give needed protein plus vitamins and minerals. Whole grain bread and cereal are not only rich in B vitamins, minerals and other nutrients, but also supply bulk to help your intestines function smoothly.

SUPPOSE YOU'RE JUST NOT HUNGRY IN THE MORNING? Or maybe you are in a rush and a whole breakfast is too much to get together. Why not make a compromise? Eat an egg or toast, or bowl of cereal with milk, at home and have the fruit at coffee break time. Or drink a glass of juice before you leave home and eat the egg and cereal later at the coffee shop. If you are not used to food first thing in the morning, this plan will ease you into eating gently. It is particularly worth the effort if you are overweight. Starting out with a good breakfast helps control food craving. It's easier to keep on eating food that is good for you - rather than sweets or empty snacks - if you start the day with an awareness of nutrition.

DOES IT MATTER WHEN YOU EAT? Frances McAfee says that "many people eat constantly from 5:00 P.M. until they turn the TV off." Is that bad? It can be. A person's needs for food are greatest during the day when he is busy. The food is digested and used to power activity. Any excess is stored as fat. But, for many of us, food eaten during a sedentary evening followed by a night's sleep can end up almost entirely in fat storage. And most of us don't need any more fat. We forget sometimes, with so many attractive snack foods available, that the primary reason for eating is to keep the body going. It is easy to get into a habit of eating when we don't need food just to experience the pleasurable sensation. That habit makes many people sick -- with overweight, heart disease, digestive troubles and other ailments. It is not necessary to stick to a rigid three-meals-a-day schedule if that doesn't suit you. Some people feel better if they eat less food more often -- perhaps five or six times a day. This can work fine as long as one fits in all the nutrients he needs -- the easiest way to do this is to follow the four basic food groups chart -- and make an effort not to overeat.
PHASE 2

1. Get into a comfortable position sitting up in a chair.

2. Let your body relax, think -- "I am at peace."

3. Begin to count backwards from 10

   9 - I am at peace
   8 - relax, let go
   7 - my body is warm and heavy
   6 - relax, let go
   5 - I'm completely relaxed
   4 - I am at peace
   3 - relax, let go
   2 - my body is warm and heavy
   1 - I am at peace

Then with each breath you take think 1(one) - 1(one) - 1(one) with each breath think one. The point of this is to associate in your mind the state of complete relaxation with the word one. This is conditioning yourself to feel very relaxed when you think one. At this phase however, do it only after counting backward from 10. Do this two times a day at a time that is convenient and free from interruptions. Do it about 5 minutes at a time -- longer if you like -- and when you want to stop, count forward to 10 slowly.

Tell yourself on the way that when you reach 10 you will feel fully alert; you will feel rested; you will feel refreshed; you will feel as though you have had a brief refreshing nap, you will be alert and awake.

This phase also should be practiced for one week.

PHASE 3

This final phase is practicing using the word one to induce a relaxed state wherever you might be, whomever you might be with. It can be used to reduce tension, control anger, handle drowsiness, reduce fear or anxiety, handle the urge to smoke, overeat. It can be used in any situation you yourself my find it useful.
PHASE 3 (continued)

Breathe slowly and regularly and think with each breath one - one - one - and let yourself go, feel your body relax, allow yourself to enjoy the relaxation. When you're ready to stop, simply go on with what you wish. Practice this about a week and you will have it for use wherever and whenever you wish. The key is Phase 1 where you are teaching yourself to know how your body feels when you are relaxed. The rest is just practice. Enjoy!
Meeting #6

Instruction Sheet

How does it feel to be a part-time nonsmoker? Are you beginning to enjoy your new "image" as a nonsmoker?

We will be considering withdrawal symptoms. Do you feel you have some unexplained physiological changes taking place? If so, let's talk about them.

WEEK'S PROJECT

During this week confine your smoking to one location, preferably isolated so you are smoking alone (in secret perhaps).

Avoid social smoking -- if you must smoke, leave the person or group and return after you have finished your cigarette.

Try adding 10-15 minutes every day to your nonsmoking three hour period. By next week it should be four to five hours. You may try for one day of nonsmoking.

HELPFUL HINTS

Sleeplessness? - This is quite common for some people and usually means your body does not need as much sleep in order to do its daily housecleaning chore. If the problem is at bedtime, try the following tips -- almost guaranteed to induce sleep:

a) Exercise until you reach a healthy state of tiredness.
b) Take a warm (not cold or hot) relaxing bath.
c) Reduce TV viewing, especially exciting, stimulating shows just before bedtime.
d) Read something light or humorous for 10-15 minutes after you retire (or before).
e) Avoid drinking stimulants, i.e. tea, coffee, cocoa or colas, for three to four hours before bedtime. It is much more relaxing to have milk, juice, or a night cap. Also, heavy snacks are often the cause for wakefulness. (One cup of coffee can act as a stimulant for up to four hours).

If you are going to sleep, but waking up at five or six a.m., you may not need to sleep longer; you could be completely refreshed. Why not get up and read, think, or go for a walk rather than lay in bed feeling frustrated?
HELPFUL HINTS (continued)

Sleepy? — Perhaps you just cannot seem to get enough
sleep. Why not treat yourself to a sleep binge for the
next few weeks? You are one of the people who are stimu­
lated by cigarettes. Now your body is finding a new norm,
the sleepiness will taper off over the next couple of weeks.
Sleep is great medicine — if you are this type.

WITHDRAWAL SYMPTOMS

The above title is somewhat frightening. It brings to
mind the severe illnesses suffered by people who withdraw
from highly addictive substances such as alcohol or heroin.

No cigarette smoker ever suffers that much -- not even
if he has been smoking three packs a day and quits cold
turkey.

One symptom may appear when you first reach a level of
twenty cigarettes a day; another may not appear until after
you reach zero. Each smoker's experience is different.
They are almost always mild and they very seldom last longer
than a week.

If a symptom persists or seems more severe than you expected,
you should, of course, consult a doctor. It is possible
that your smoking has been masking the symptoms of some
illness; and when you stop smoking, the symptoms abruptly
become noticeable.

Here are some of the bodily changes you can expect:

Occasional Dizziness — Many smokers report this effect.
It is caused by the fact that you are now absorbing more
oxygen through your lungs than your body has been accustomed
to. The dizziness may come upon you once or twice a day
for a few days. It usually lasts one or two seconds; it
is gone before you have time to do anything about it.

Headache — One smoker in four reports a mild headache at
some time during his route to zero. It may last a day,
then go, then return a week later. The causes are unknown.

Hunger — Almost all smokers notice this symptom. You tend
to eat more than you used to. Your body's absorption of
food is improved too, so that you gain more nourishment
even if you do not actually increase the amount you eat.
WITHDRAWAL SYMPTOMS (continued)

Constipation - For complicated reasons, the intestinal motility may decrease for a brief period when a smoker reduces his cigarette consumption. This symptom rarely lasts longer than three or four days.

Tremor - You may notice that your hands and fingers tremble slightly, perhaps for several weeks. Your doctor's opinion is best as to whether or not the problem is severe enough to warrant medication. The tremor is never very pronounced and always subsides as your body gets used to its new nonsmoking habit.

Perspiration - This is another reaction similar to the tremor. It will go away after a while. Frequent warm baths or showers can help dispel both the perspiration and the tremor.

Coughing More - As the cilia come back to life and rebuild, they start to clean the bronchial tubes and move the phlegm thus causing increased cough. This lasts only a few weeks and results in disappearance of the "smoker's cough."

Sleep Pattern Disturbances - Some smokers complain that they find it difficult to sleep as they head down toward zero. As a smoker, you have lacked energy, and what is more, your sleep may not have been restful because it has been interrupted constantly by coughing and difficulty in breathing. Now that you are smoking less or not at all, your body is healthier. It is charged with an energy that you have not experienced in a long time. It isn't as weary. It needs fewer hours of sleep -- and the sleep it does get is more restful. Thus, when you suddenly wake up at 5:00 A.M you may think you are a victim of insomnia but probably are not. All that has happened is that your body has had the sleep it needs; it wants no more.

Sore Scalp - Some new nonsmokers find the surface of their scalp is very sensitive for a few days; sometimes touching or combing their hair is painful. This can only be attributed to the blood pressure change as general circulation improves.

Sore Throat - Frequently the person who stops smoking or who drastically reduces cigarette consumption, will experience a sore throat and other cold symptoms.
WITHDRAWAL SYMPTOMS (continued)

Mouth Sores or Blisters - For reasons that are not well understood, a small percentage of smokers suffer mouth irritations as they head down the road to zero, or afterward. These irritations may be in the form of blisters, sores, or inflammation on the gums, tongue, or palate. The problem seems to arise somehow from chemical adjustments in the mouth which for years has had to withstand incessant assaults of hot smoke but is now freed of the burden. The feeling is returning to this area and once total cessation has taken place, the throat should heal quickly. If soreness persists for more than 10 days after total cessation, a doctor should be consulted.

Spaced Out - This vague but annoying symptom is linked with carbon monoxide withdrawal -- this symptom gives one the feeling of being in another dimension. Distance and space if affected, a floating feeling is experienced as well as a total lack of concentration.

Nervousness - Chemicals in tobacco smoke affect the entire central nervous system, accounting for the return of a keener sense of smell, taste, hearing, colour and depth perception when one succeeds in quitting. It is only fair to warn people that quitting is difficult, and because their nervous systems have been affected, it does result in a period of nervousness sometimes lasting for a few days. Relaxation techniques such as deep breathing or an exercise program may minimize these symptoms.
Meeting #7

Instruction Sheet

Hope you remembered your pack of cigarettes.

Are you glad you have personally committed yourself to respect and protect your body? After all, it's the only one you will ever have.

For the next few days (maybe weeks) it will be necessary to control your time, avoid becoming bored, avoid people or situations that make you feel angry or irritated. Tell your family, co-workers and friends they will just have to put up with you if you have a few flare-ups -- after all it's worth it because you will never again be a polluter of either your own body or the lungs and bodies of those around you.

This next week can be looked upon as a "health kick." Eat lots of good food; consult your list if you are concerned about weight problems, treat your taste buds to delicious soups, salads and fresh fruit.

Have you noticed that smokers look edgy part of the time. They are only relaxed and satisfied for a few minutes after each cigarette, then the demand starts all over again. What a drag!

If you think of smoking remember that most people smoke NOT for enjoyment but because they are miserable if they do not.

WEEK'S PROJECT

This is a good week to clean all clothing, air out closets, have drapes and carpets cleaned -- in fact a good week to do anything that rids a home of stale tobacco odors.

If smoking -- restrictive smoking and solitary.

If not - Avoidance of smoking situations.
    - time for a personal reward.

Prescription for fitness. Exercise program explained. If you were unable to participate in Saturation Smoking and are still smoking you must seriously consider setting a date for quitting. At the next session your counsellor will ask you for a definite date for quitting.
HELPFUL HINTS

Depression, irritation or other unpleasant feelings during the next few days will be short-lived experiences. Faithfully contacting a phone buddy can be most reassuring.

Keep the hands busy. Peanuts in the shell can be a great help. Not only do they take time to eat, but they are nutritious as well. Under no circumstances should salted nuts be substituted. They are high in calories and just too easy. It would defeat the handling purpose and no doubt any weight gain would be regretted.

The desire for a smoke usually lasts only seconds:

1. Take a couple of deep breaths.
2. Think about something else.
3. Phone your buddy.
4. Move to another area of your home, office, etc.
5. Make fists -- do exercises, etc.
6. Read your list of reasons for succeeding.

During the next week you may need these three weapons:

1. Avoidance of smoking situations.
2. Substitutions for smoking.
3. Thought control, or delaying techniques.

Plan a series of rewards – tickets to the theatre or the game, a new record, time out for a walk in the park. Be sure to reward yourself for "good effort."
Meeting #8

Instruction Sheet

Now that SUCCESS is the name of the game, how do you feel? Was it worth it to reach the top rung of the ladder? Could you face going back to the old rut? Do you find a new challenge in starting each day as a non-smoker.

Let's consider the dangers. Where could you fall down and lose the benefits of all the effort spent? This takes us back once more to the feelings list; preoccupation and lack of alertness could result in slipping back into the old routine -- the old comfortable rut -- and the endless chain of cigarettes -- the old cough, guilt and lack of energy.

Eventually you will live and enjoy your new lifestyle as a nonsmoker without ever thinking about it one way or the other. In fact, it won't be long until you find yourself watching someone else smoke, and find it hard to believe you were ever a smoker yourself.

WEEK'S PROJECT

For the coming week try to plan for future activities that you really enjoy. Time could become an enemy if you allow yourself to become bored. Unfortunately, time is the one thing we cannot save, borrow, buy or re-use. If a minute, an hour or a day is wasted, it is GONE FOREVER! Why not use it?

PROJECTION CHART

Becoming a smoker started with just one cigarette. Avoiding starting again means not having that first cigarette. The best defence against smoking will be knowing how to relieve boredom and avoid frustration. After completing the projection chart, you may wish to make copies of things to do to carry in your wallet, car or desk.

1) When I feel a strong urge to smoke I will:
   a) __________________________________________________________
   b) __________________________________________________________
   c) __________________________________________________________
2) Three things I can do if I am alone:
   a) ________________________________
   b) ________________________________
   c) ________________________________

3) Three activities I can share with another person:
   a) ________________________________
   b) ________________________________
   c) ________________________________

4) Three group entertainment projects:
   a) ________________________________
   b) ________________________________
   c) ________________________________

WEIGHT CONTROL TIPS

Many smokers have expressed their concern, regarding weight gain when they stop smoking. While it is true that some people gain a few pounds, many do not, and some even lose weight. To help you develop a weight control program while quitting, the following guide should be referred to regularly:

Eat all you want of these - either raw or cooked.

<table>
<thead>
<tr>
<th>Apples</th>
<th>Endive</th>
<th>Peas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asparagus</td>
<td>Escarole</td>
<td>Pimentos</td>
</tr>
<tr>
<td>Bean Sprouts</td>
<td>Fennel</td>
<td>Dill pickles</td>
</tr>
<tr>
<td>Beet Greens</td>
<td>Green &amp; red ppr.</td>
<td>Radishes</td>
</tr>
<tr>
<td>Broccoli</td>
<td>Kale</td>
<td>Rhubarb</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Kohlrabi</td>
<td>Sauerkraut</td>
</tr>
<tr>
<td>Carrots</td>
<td>Lettuce</td>
<td>Spinach</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>Mushrooms</td>
<td>Squash (zucchini)</td>
</tr>
<tr>
<td>Celery</td>
<td>Mustard greens</td>
<td>String beans</td>
</tr>
</tbody>
</table>
## WEIGHT CONTROL TIPS (continued)

Use with caution:

<table>
<thead>
<tr>
<th>Item</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcoholic beverages, beer</td>
<td>Ketchup</td>
</tr>
<tr>
<td>Avocado</td>
<td>Mayonnaise</td>
</tr>
<tr>
<td>Bacon or back fat</td>
<td>Muffins or biscuits</td>
</tr>
<tr>
<td>Butter - cream cheese</td>
<td>Nuts - oil - olives</td>
</tr>
<tr>
<td>Cake - candy - chocolate</td>
<td>Pancakes - peanut butter</td>
</tr>
<tr>
<td>Cereals</td>
<td>Potatoes</td>
</tr>
<tr>
<td>Coconut - cookies - crackers</td>
<td>Pies - popcorn - potato chips</td>
</tr>
<tr>
<td>Corn</td>
<td>Pretzels - puddings</td>
</tr>
<tr>
<td>Cream (sweet or sour)</td>
<td>Rice</td>
</tr>
<tr>
<td>Doughnuts</td>
<td>Rolls - special breads</td>
</tr>
<tr>
<td>French fries - fried foods</td>
<td>Salad dressings</td>
</tr>
<tr>
<td>Gravy - honey - ice cream</td>
<td>Salty foods</td>
</tr>
<tr>
<td>Smoked fish or meat</td>
<td>Sardines</td>
</tr>
<tr>
<td>Sugar and syrups</td>
<td>Soda, ginger ale - cola drinks</td>
</tr>
<tr>
<td>Ices</td>
<td>Spaghetti</td>
</tr>
<tr>
<td>Jam</td>
<td>Waffles</td>
</tr>
<tr>
<td>Jelly</td>
<td>Yogurt</td>
</tr>
</tbody>
</table>
Meeting #9

Instruction Sheet

What was the easiest part of your week? What was the most difficult part of the week? Let's talk about it.

Have your moods and feelings astounded you? Remember the feelings are normal. Do you now feel that you are on your way to a healthy, happy future? Enjoying your life to the fullest all the days of your life? It is a good feeling, isn't it?

How are your friends reacting? Is your family proud of you? Have you told your doctor that you have succeeded in quitting?

TAKE TIME TO READ AND REREAD YOUR MATERIAL. TRY TO REMEMBER HOW YOU FELT DURING THE FIRST WEEK - HAVE YOUR FEELINGS CHANGED EACH WEEK? CAN YOU SEE THE GROWTH FROM A SMOKER TO A NONSMOKER? THIS IS AN ACHIEVEMENT -- SAVOUR IT AND ENJOY IT.

WEEK'S PROJECT

Trial run with a stressful or smoking situation. In order to cope with future stress, let's look at it.

Stress -- according to Webster's dictionary is:

1. To subject to the action of external forces.
2. To over strain.
3. To exert intense effort, urgency.

Choose a challenging situation for a test run this week. Examples:

1. Visit an old smoking friend for half an hour.
2. Go for a cocktail as a nonsmoker.
3. Test a stressful situation.

The possibilities are limitless. Keep up the practice of renewing the self image. Be glad you do not need to smoke. Be cautious about slipping back into the old rut.

Next week is graduation.
**WEEK'S PROJECT** (continued)

<table>
<thead>
<tr>
<th>STRESS SITUATIONS</th>
<th>ALTERNATIVE METHODS OF COPING</th>
</tr>
</thead>
<tbody>
<tr>
<td>List the most stressful situations you expect could arise in the next 2 months</td>
<td></td>
</tr>
</tbody>
</table>
THE BENEFITS OF SUCCESS

1. I can breathe easier.
2. I have an increased sense of well being.
3. I like myself better as a nonsmoker.
4. I feel cleaner.
5. My fingers and teeth are no longer stained.
6. I feel more refreshed after a night's sleep.
7. I am sleeping more soundly.
8. I need less sleep.
9. I have more energy.
10. My cough has disappeared.
11. I know I am a safer driver.
12. My mouth tastes cleaner, so I know my breath is fresher.
13. I have more time for my family, hobbies and work.
14. My home and car are cleaner -- no more burn holes, ashes and smoke film on everything.
15. My family and friends are proud of me.
16. I am saving money for more important things.
17. I am not hooked.
18. I am more self-confident.
19. My complexion is improved.
20. I don't feel guilty.
21. I can enjoy good tastes & smells.
22. I know myself better, and feel more tuned in to life.
SMOKING CESSATION PROGRAM

Meeting #1

Welcome to the first session!

Hopefully, you will find the next five weeks interesting as:

- you will learn a great deal about why you smoke
- you will get to know the other people in the group and obtain support and strength from them
- you will be moving towards your goal of achieving the status of a NON-SMOKER

A FEW GROUND RULES

1. You have the right to express your own ideas and feelings and you should feel comfortable in so doing.

2. You can and you should ask questions that come to mind - be spontaneous.

3. It is your responsibility to attend all sessions.

4. You should be ready and willing to help, encourage and support the other members of the group.

5. Read all materials thoroughly and try to follow instructions carefully.

6. Try to avoid getting sidetracked. The whole purpose of this group experience is to assist you in becoming a NON-SMOKER.

PROJECT

Because smoking is basically a social habit, DO NOT OFFER a cigarette to anyone, DO NOT ACCEPT a cigarette from anyone and DO NOT LIGHT a cigarette for another person.

SCORE CARD

Starting tomorrow morning, record the time at which you light up every cigarette throughout every day.
HELPFUL HINTS

1. As your taste buds perk up you will require less seasoning with your food.

2. Decrease the amount of sugar you use in tea and coffee. It causes weight gain and increases your craving to smoke.

3. Why not start a PIGGY BANK? Either daily or weekly, calculate the amount you save by smoking less. This money should be earmarked for dining out, starting a new hobby, part of a new wardrobe or, perhaps, a vacation!

4. Take a multiple vitamin daily or increase your intake of raw, fresh fruits and vegetables.

5. Soon you will have more time so why not bring out all your old, neglected hobbies. All time fillers should be considered as a BONUS – after all, you are quitting smoking and you deserve time to enjoy yourself.

I like to smoke because - I would like to quite because -
Welcome! I hope that by this time you are beginning to recognize how many cigarettes you smoke in robot-like fashion, for no reason at all.

**CONTRACT**

By the next meeting I will want you to sign a contract indicating when you will have quit smoking. You should be aiming for no later than the end of the fourth week of the project. In preparation for this I want you to start thinking about being a non-smoker. How are you going to quit? Cold turkey? Or cutting down slowly day by day? However you do it I want you to establish a date by which time you will have **QUIT**!

**PROJECT**

In addition to smoking fewer cigarettes, from now on, you are required to choose one meal during each day and **NOT** smoke for 30 minutes after it. Remember, we are unlearning habits. A 30 minute eating binge does not count – you want 30 foodless, smokeless minutes!

Here are some tips to make it easier:

- leave the table as soon as you finish your meal
- take your beverage to another room and read instead of smoking – choose something interesting
- brush your teeth and use dental floss or toothpicks after every meal
- rinse your mouth with salt water (or soda or mouth wash)
- chew sugarless gum
- go directly to a hobby
- read your list of reasons for wanting to quit
- visit a non-smoking friend
- go to a non-smoking area – library, for example
SCORE CARD

For the remainder of the week record the time of each cigarette plus the accompanying activity (working, sitting at desk, watching TV, etc.).

HELPFUL HINTS

- try not to nibble - it is better to have one delicious dessert once a day as a reward rather than munching snacks all day - drink unsweetened fruit juices - grapefruit and tomato are especially good

- every time you don't smoke, give yourself a verbal pat on the back "Well done!"

- have you eliminated sugar in your tea and coffee - try using a different brand of coffee or using an artificial sweetener

- be proud of yourself!

Ideas for smokers who are trying to quit

Quitting smoking only means a gain in body weight if you take in more calories than you expend. Here are some suggestions to keep you from feeling deprived:

- keep a cut, ready supply of the following in the refrigerator - raw vegetables, broccoli, green beans, cucumber slices, green pepper strips, cauliflower, mushrooms, carrots, celery, radishes, cherry tomatoes

- low fat cottage cheese dip (add onion or garlic powder - use with raw vegetables or crackers)

- tomato or V-8 juice

- dill pickles, sour pickles

- fresh fruit, especially cantaloupe, strawberries, grapefruit, oranges, tangerines

- low calorie gelatin dessert

- sugarless mints and gum

- skim milk

- crackers (rye krisp, wheat wafers), puffed wheat or puffed rice, homemade popcorn without added salt or fat, unshelled peanuts - these keep your hands busy as well as requiring a lot of chewing
Ideas for smokers who are trying to quit (continued)

- cold water (with ice) – drink through a fat straw
- cinnamon sticks
- whole cloves
- bits of orange or lemon peel

Remember that each package of cigarettes creates as much wear and tear on your body as carrying 65 extra pounds of fat!
University of Western Ontario
Faculty of Physical Education

SMOKING CESSATION PROGRAM

Meeting #3

Welcome! Are you beginning to feel the crunch? If your moods have changed over the last few days, do not be surprised! Positive and negative swings in mood are normal under any circumstances and negative mood changes, some misgivings, are to be expected when you are quitting smoking. On the other hand, you should be proud of your accomplishments to this point! Of course, there will be times when you will feel very discouraged - please don't give up!!

Today we will be discussing how you made out in your thirty minutes of non-smoking after a meal. Have you noticed any changes in how you feel? Are you breathing more easily, coughing less?

ATTENDANCE CARD

Complete the calculation on the second page of your cigarette score card and enter the average number smoked per day against Session 3 on the attendance card. What word(s) describe(s) how you feel about quitting today - right now?

Make sure that you pick up a cigarette score card for this coming week. Good luck!

PROJECT

This week's project is three hours of non-smoking. Select any three hours of the day - choose the easiest part of the day - and fill these hours with other activities. The first few days will not be easy but once you are over that hurdle you may find yourself not thinking about cigarettes for hours on end.

Read your "reasons for quitting" once every day!

Start to visualize yourself as a non-smoker.

STIMULUS CONTROL

Let's check last week's score card. What was the most frequent "trigger" to cigarette smoking each day? How do you plan to control these? What can you suggest?
STIMULUS CONTROL

When you record the time of each cigarette starting tomorrow, evaluate your feelings before you lit up the cigarette using the following "urge rating scale."

I want this cigarette:-

1. a little - I could really do without it!
2. somewhat - perhaps I could do without it
3. a moderate amount - vague desire
4. quite a bit - I need it
5. very much - craving

Place the appropriate number beside the time for each cigarette.

HELPFUL HINTS

- Although most people think that they smoke to relax, in actual fact, the reasons why people smoke fall into three categories.

  1. Chemical need - a few cigarettes every day to keep the jitters away - the basic "need" cigarettes.

  2. Habit or "taste" cigarettes - with coffee, after meals, with an alcoholic beverage, etc.

  3. Emotional smoking, "feelings" cigarettes - those associated with or triggered by anger, boredom, excitement, fear, stress, tension, etc.

- Start to study non-smokers - what do they do with their hands? Do they look relaxed and comfortable without a cigarette? What can you learn from them?

- Remember to drink lots of iced water with a straw - great while reading, watching TV, playing cards, etc.

- Try to anticipate stressful or emotional times in order that you can plan ahead and develop appropriate strategies in order to help you cope.

- Remember, you're in control!!!
SMOKING CESSATION PROGRAM

Meeting #4

Welcome! Are you beginning to feel like a part-time non-smoker?

Would you like some support from a telephone partner, a "buddy" to help you over these tough moments when you feel you must have a cigarette but know you shouldn't? Is there someone in the group you would like to have as a daily contact person? This person should not be a relative, friend or neighbour!

Do not forget to try deep breathing as a strategy to help you relax. It can be helpful while driving, waiting for a meeting and especially when you are angry or upset.

Continue to not smoke for 30 minutes after a meal and maintain the three hour NON-SMOKING period.

PROJECT

Starting tomorrow you are asked to smoke ONE cigarette EACH DAY in front of a mirror. A smoker, on the average, goes through the act of smoking - puffing - about 250 times every day. Is it any wonder that smokers develop a great number of facial wrinkles. You will begin to see your role as a smoker in its true perspective!

As a contrast, at least once each day look at yourself in a mirror without a cigarette. Which looks better? Which is the real you? The world can see you either way - puffing or not - you cannot be both at the same time. Do you really like the smoker? Does the non-smoker like you?

HELPFUL HINTS

When you socialize, start to play the role of a non-smoker! Again, think ahead and try to anticipate these occasions. If you can manage to "role-play" for one hour or so at a party or card game it is good practice. Remember, you're winning!
HELPFUL HINTS (continued)

Change brands, switch to a different colour of package - continue to make smoking different - hold the cigarette in the opposite hand, use other fingers - clear your home of ashtrays - you may wish to keep one or two for company but keep them out of sight.

GOOD LUCK!
SMOKING CESSATION PROJECT

Session #5

Who said it was easy to quit smoking? All forms of health behaviour change are difficult to bring about. When you do quit, however, you will feel GOOD! It is a major accomplishment.

Continue to make smoking an unusual experience - use the other hand, hold the cigarette in a strange or different way, change brands daily, etc.

Buddy system. Have you tried linking up with a buddy? Does it help?

PROJECT

For the next few days you are asked to eliminate the first cigarette of the day. For many, this is the wake-up cigarette. Getting rid of this cigarette, for some people, is a critical step in moving towards complete cessation. Play a game with yourself - see how long you can go before you have that first cigarette in the morning!

Take time to re-write your list of reasons for quitting.

CIGARETTE SCORE CARD

By this time you should be feeling more in control of your smoking behaviour. At the top of your score card write "DO I REALLY NEED THIS CIGARETTE?" in block capital letters. Ask yourself this question each time and see if you can wait five, ten or fifteen more minutes before you smoke that cigarette.

HELPFUL HINTS

- start a new policy of not smoking in your bedroom - have the bedding cleaned or aired, clean the drapes and carpets and place an air freshener in the room - you will soon appreciate the clean freshness of this one room and the atmosphere will contribute to a better sleep and a "fresher" start in the morning.
HELPFUL HINTS (continued)

- start to change your method of lighting cigarettes so that you will be constantly reminded that you are attempting to change your smoking behaviour — use wooden matches instead of a lighter, etc. to remind you to hold the cigarettes in the other hand, use an old sardine can as an ashtray, etc.

POSITIVE THINKING — STOP SMOKING: START LIVING

Since the human mind can only hold one thought at a time, it does not make much sense to hold an ugly, negative thought when one could be thinking a positive or beautiful thought.

As a nonsmoker you are moving out of the clouds into the sunlight. In order to enjoy your new freedom, here is a collection of thoughts and ideas you may find helpful.

A healthy body is essential to the enjoyment of life. One owes oneself the respect and consideration that it deserves (in this case quitters are winners).

A person's life can be likened to a plot of ground: if you sow and cultivate flowers, that is what will grow in the soil, but if you let it go and ignore it completely, it will likely become overgrown with weeds. It is conceivable you could also grow poisonous plants or nettles, it is your choice. (The same thing applies to every person's thoughts and life). What is growing in your garden?

New habits are like a new skill, practiced often they become second nature. You have a new habit — a habit of Not Smoking.

A LITTLE ENCOURAGEMENT

In the U.S.A. two million people stop smoking every year. We don't have accurate Canadian Statistics, but it is estimated that 200,000 people stop smoking every year in Canada.

The high cost of cigarettes can only increase as the cost of living goes up. By not smoking you have an "income tax free" extra $300.00 every year — based on one package per day — of course many people smoke more. Five years of not smoking or $2,100.00 could provide a great holiday, near new car, sail boat or?? What treats can you think of? Maybe you would rather help a crippled child or donate the savings to research or???
A LITTLE ENCOURAGEMENT (continued)

Thousands of people wish they had not started to smoke. Every day thousands of people try to stop smoking.

You have achieved a much desired status. By becoming a nonsmoker you are the envy of many and you should try to remember that thousands of people trying to stop wish they too were no longer smoking.
SMOKING CESSATION PROJECT

Session #6

Do you feel like a part-time non-smoker? Would you not rather be a full-time non-smoker?

Are you experiencing "withdrawal symptoms"? Do you feel you have some unexplained physiological changes taking place? Why not discuss these with the group?

PROJECT

During this week please confine your smoking to one location - preferably isolated - so that you are smoking alone.

Avoid smoking with other people - social smoking. If you must smoke, excuse yourself - leave the person or group and return after you have finished your cigarette.

Try to add 10-15 minutes every day to your non-smoking three hour period. Before long, it should be 4-5 hours!

HELPFUL HINTS

Sleeplessness. This is quite common - it usually means that your body does not need as much sleep in order to restore normal energy levels - to "recharge your batteries"! If you are finding difficulty in getting to sleep at bedtime try the following tips:

- take a warm (not hot) relaxing bath
- reduce TV viewing, especially exciting, stimulating shows just before going to bed.
- read something light or humorous either after you retire or just before going to bed
- avoid drinking stimulants (tea, coffee, cocoa or cola) for 3-4 hours before bed - it is much more relaxing to have milk, juice or a night cap
- avoid large, heavy snacks just before bed.
HELPFUL HINTS (continued)

If you are falling asleep but waking much earlier than usual at five or six A.M., it may be that you do not need to sleep longer. Why not get up, read or start into some project you have not had time for rather than lie in bed feeling frustrated.

Sleepy? Perhaps you cannot get enough sleep. Why not treat yourself to a sleep binge for the next few weeks. You are one of the people who are stimulated by cigarettes and your body is finding a new norm. This situation will taper off over the next couple of weeks. Sleep is great medicine if you are this type of person.
RELAXATION MADE EASY WITH RELAXATION CONDITIONING

J. L. Bass

This relaxation exercise combines elements from several techniques. Those of you who have used Yoga will recognize "The Sponge." If anyone is familiar with "Autogenic Training" there are elements from it. A third element is from a technique called "Metronome Conditioned Relaxation." Each of these techniques can be used alone with great effectiveness and the point is to find something which works for you.

The following exercise is useful in that the ultimate goal is to condition yourself to respond to one word and thus experience a relaxed state wherever you are; at work, at play, whether other people are around or not. It is not something for which you need privacy or space and thus it's usefulness is greatly extended.

There are three phases to the conditioning process: the first phase is to learn what true relaxation feels like (many people think they know, but find they don't really); the second phase is to practice the relaxation and heighten it, and to establish the connection between feeling relaxed and certain words; the third phase practicing the instant method of inducing relaxation. Each phase should be practiced for about a week, at least once daily, preferably twice, at a time convenient to you. Just before going to sleep at night is convenient for many people. It is useful during the first phase to lie down; during the second phase to practice sitting in a chair and the third phase may be practiced anywhere.

PHASE 1

1. Get into a comfortable position lying down, preferably on your back.

2. Beginning with the right foot and lower leg, tense your muscles just as much as you can; the more you tense your muscles the more you will experience the relaxation when you release. Proceed with the left foot and lower leg and continue to the thighs and hips. Feel the heaviness.

3. Continue to the stomach and abdomen – tense and then release. Feel the warmth.

4. Proceed to your right hand and arm – tense and relax. Allow yourself to feel the change and experience the feeling of release and relaxation.
PHASE 1 (continued)

5. Continue with your left hand and arm - tense then release - feel the heaviness.

6. Move on to your neck - tense - release - feel the difference.

7. Lastly, as much as you can, tense and release the muscles of your face and scalp so that from top to toe you experience the warmth, the heaviness, the peace of complete relaxation.

8. While you are practising, think of yourself:
   "I am at peace"    "My arms and legs are heavy"
   "Relax, let go"    "My body is warm and heavy"

PHASE 2

1. Get into a comfortable position sitting up in a chair.

2. Let your body relax, think - "I am at peace."

3. Begin to count backwards from 10
   9 - I am at peace
   8 - relax, let go
   7 - my body is warm and heavy
   6 - relax, let go
   5 - I'm completely relaxed
   4 - I am at peace
   3 - relax, let go
   2 - my body is warm and heavy
   1 - I am at peace

   Then, with each breath you take think 1 (one) - 1 (one) - 1 (one) with each breath think one. The point of this is to associate in your mind the state of complete relaxation with the word one. This is conditioning yourself to feel very relaxed when you think one. At this phase however, do it only after counting backward from 10. Do this two times a day at a time that is convenient and free from interruptions. Do it about 5 minutes at a time - longer if you like - and when you want to stop, count forward to 10 slowly.

   Tell yourself on the way that when you reach 10 you will feel fully alert; you will feel rested; you will feel refreshed; you will feel as though you have had a brief, refreshing nap, you will be alert and awake.

   This phase also should be practiced for one week.
PHASE 3

This final phase is practicing using the word one to induce a relaxed state wherever you might be, whomever you might be with. It can be used to reduce tension, control anger, handle drowsiness, reduce fear or anxiety, handle the urge to smoke, overeat. It can be used in any situation you yourself may find it useful.

Breathe slowly and regularly and think with each breath one - one - one - and let yourself go, feel your body relax, allow yourself to enjoy the relaxation. When you're ready to stop, simply go on with what you wish. Practice this about a week and you will have it for use wherever or whenever you wish. The key is Phase 1 where you are teaching yourself to know how your body feels when you are relaxed. The rest is just practice. Enjoy!
SMOKING CESSATION PROJECT

Session #7

How strong is your resolve to quit smoking today? Remember - when you quit smoking, you commit yourself to a program which protects your body and increases the respect which you have for your body.

For the next few days - maybe a few weeks - it will be necessary to:

- control your time
- avoid being bored
- avoid people or situations which make you become angry or irritated
- avoid the social situations in which you normally had a cigarette
- discuss your stop smoking program with family, co-workers and friends
- ask them to be patient with you if you "blow-up" from time to time - assure them that you will never again be a polluter of either your own body or the lungs and bodies of those around you.

Go on a "health kick"! Eat lots of good food - are you eating a balanced diet with plenty of vitamins? Treat your taste buds to delicious soups, salads and fresh fruit.

If still smoking:

- try to put off that first cigarette in the morning for as long as possible - you should be attempting to reach 12 noon before having a cigarette.
- continue with at least three hours of non-smoking at some other time of the day - try to extend this period - soon there will be little time left for smoking!
- remember to smoke alone (if you have to!)
If not smoking:

- avoid social and other situations which used to "trigger" a cigarette
- attempt to change your lifestyle - try to design a new approach to life which will "fit" the "new you"!
- give yourself a pat on the back, a treat, a reward.

HELPFUL HINTS

Depression, irritation or other unpleasant feelings during the next few days will be short-lived experiences. Calling someone else in the group (a phone buddy) can be most reassuring at times like these.

Keep the hands busy! Peanuts in the shell are great - not only do they take time to eat but they are nutritious as well. Salted peanuts should certainly not be substituted - they are high in calories and just too easy!

The desire for a cigarette lasts only a few seconds:

- take ten (10) deep breaths
- think about something else - anything else
- phone your buddy or a non-smoking friend
- move to another area of your home, office, school, etc.
- clench and unclench your fists 20 times
- read your list of reasons for quitting smoking

The following are three important weapons:

1. Avoid smoking situations
2. Find substitutes for smoking
3. Use delaying tactics
University of Western Ontario
Faculty of Physical Education

SMOKING CESSATION PROJECT

Session #8

Now that SUCCESS is the name of the game, how do you feel? Make a list of the ways in which you feel better! Could you face going back to the old rut - dirty ashtrays, burns in the carpet, etc., etc.? How do you react to the challenge of starting each day as a non-smoker?

Eventually you will live and enjoy your new lifestyle as a nonsmoker without ever thinking about it. In fact, one of these days you will find yourself watching someone else smoke a cigarette and find it hard to believe you were ever a smoker yourself!!

PROJECT

Becoming a smoker started with just one cigarette. Avoiding starting again means not having that first cigarette. The best defence against smoking will be knowing how to relieve boredom and avoid frustration. After completing the following chart, you may wish to make copies of it to carry with you in wallet or purse or to leave in your desk or car.
1. When I feel a strong urge to smoke I will -
   a) ____________________________________________________________
   b) ____________________________________________________________
   c) ____________________________________________________________

2. Three things I can do if I am alone -
   a) ____________________________________________________________
   b) ____________________________________________________________
   c) ____________________________________________________________

3. Three activities I can share with another person -
   a) ____________________________________________________________
   b) ____________________________________________________________
   c) ____________________________________________________________

4. Three group projects -
   a) ____________________________________________________________
   b) ____________________________________________________________
   c) ____________________________________________________________
HELPFUL HINTS

Weight Control Tips

Many smokers have expressed their concern, regarding weight gain when they stop smoking. While it is true that some people gain a few pounds, many do not, and some even lose weight. To help you develop a weight control program while quitting, the following guide should be referred to regularly:

Eat all you want of these - either raw or cooked.

<table>
<thead>
<tr>
<th>Apples</th>
<th>Endive</th>
<th>Peas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asparagus</td>
<td>Escarole</td>
<td>Pimentos</td>
</tr>
<tr>
<td>Bean Sprouts</td>
<td>Fennell</td>
<td>Dill pickles</td>
</tr>
<tr>
<td>Beet Greens</td>
<td>Green &amp; red ppr.</td>
<td>Radishes</td>
</tr>
<tr>
<td>Broccoli</td>
<td>Kale</td>
<td>Rhubarb</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Kohlrabi</td>
<td>Sauerkraut</td>
</tr>
<tr>
<td>Carrots</td>
<td>Lettuce</td>
<td>Spinach</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>Mushrooms</td>
<td>Squash (zucchini)</td>
</tr>
<tr>
<td>Celery</td>
<td>Mustard greens</td>
<td>String beans</td>
</tr>
</tbody>
</table>

Use with caution:

<table>
<thead>
<tr>
<th>Alcoholic beverages, beer</th>
<th>Ketchup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avocado</td>
<td>Mayonnaise</td>
</tr>
<tr>
<td>Bacon or back fat</td>
<td>Muffins or biscuits</td>
</tr>
<tr>
<td>Butter - cream cheese</td>
<td>Nuts - oil - olives</td>
</tr>
<tr>
<td>Cake - candy - chocolate</td>
<td>Pancakes - peanut butter</td>
</tr>
<tr>
<td>Cereals</td>
<td>Potatoes</td>
</tr>
<tr>
<td>Coconut - cookies - crackers</td>
<td>Pies - popcorn - potato chips</td>
</tr>
<tr>
<td>Corn</td>
<td>Pretzels - puddings</td>
</tr>
<tr>
<td>Cream (sweet or sour)</td>
<td>Rice</td>
</tr>
<tr>
<td>Doughnuts</td>
<td>Rolls - special breads</td>
</tr>
<tr>
<td>French fries - fried foods</td>
<td>Salad dressings</td>
</tr>
<tr>
<td>Gravy - honey - ice cream</td>
<td>Salty foods</td>
</tr>
<tr>
<td>Smoked fish or meat</td>
<td>Sardines</td>
</tr>
<tr>
<td>Sugar and syrups</td>
<td>Soda, ginger ale - cola drinks</td>
</tr>
<tr>
<td>Ices</td>
<td>Spaghetti</td>
</tr>
<tr>
<td>Jam</td>
<td>Waffles</td>
</tr>
<tr>
<td>Jelly</td>
<td>Yogurt</td>
</tr>
</tbody>
</table>
Welcome to the last week!

How has everyone been doing? What has been the easiest part of the weekend? What has been the toughest?

ATTENDANCE CARD

Calculate average number of cigarettes smoked during last 7 days. Enter in space - Session #9. What word is appropriate right now to describe how you feel about quitting.

PROJECT

Test yourself in a slightly stressful situation - this depends on individual and how confident you are - this may be too dangerous for some and pretty easy for others. Good to test yourself - like putting big toe in bathwater - be wary - go easy to begin with - half an hour is enough to begin with - remember - it only takes one cigarette to make you a smoker again!

REVIEW

The benefits of success.
Appendix J

University of Western Ontario
Faculty of Physical Education

PHYSICAL ACTIVITY INVENTORY

Date ______________

If you participated or performed any of the following forms of physical activity during the past seven days please indicate how often and for how long.

Thank you.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>No</th>
<th>Frequency</th>
<th>Average duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking for pleasure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking to and from work</td>
<td></td>
<td></td>
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<tr>
<td>Walking during work breaks (lunch, etc.)</td>
<td></td>
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<tr>
<td>Using stairs instead of elevator</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Hiking (Bruce Trail, Thames Valley Trail)</td>
<td></td>
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<tr>
<td>Bicycling to work</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycling for pleasure</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Dancing (Ballroom or Square)</td>
<td></td>
<td></td>
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<tr>
<td>Exercise (calisthenics) at home</td>
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<tr>
<td>Exercycle at home</td>
<td></td>
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<tr>
<td>Exercise at club (Vic Tanny's, etc.)</td>
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</tr>
<tr>
<td>Jogging and/or walking</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Weight training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water skiing</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Sailing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Yes</td>
<td>No</td>
<td>Frequency How often?</td>
<td>Average duration each session</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----</td>
<td>----</td>
<td>----------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Canoeing/Rowing for pleasure</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Swimming in pool</td>
<td></td>
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<tr>
<td>Swimming at beach or lake</td>
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</tr>
<tr>
<td>Scuba-diving/snorkeling</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Bowling (5 and 10 pin)</td>
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<td></td>
</tr>
<tr>
<td>Lawn Bowling</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Volleyball</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Table Tennis</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Tennis (singles or doubles)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Softball</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Badminton</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Paddleball</td>
<td></td>
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</tr>
<tr>
<td>Racquetball</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basketball - scrimmage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basketball - game</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Touch football</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Handball</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squash</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soccer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Golf - power cart</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Golf - walking pulling cart</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Golf - walking carrying clubs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Yes</td>
<td>No</td>
<td>Frequency How often?</td>
<td>Average duration each session</td>
</tr>
<tr>
<td>----------------------------------</td>
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</tr>
<tr>
<td>Golf - driving range</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mowing lawn riding power mower</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mowing lawn walking behind mower</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mowing lawn pushing hand mower</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weeding, raking, hoeing garden</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spading, digging garden</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raking lawn</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Carpentry in workshop</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Painting inside house, hanging wallpaper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Painting outside home</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpentry outside house</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housework, walking, dusting, vacuuming</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housework - standing, doing dishes, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix K

DUNCAN'S MULTIPLE RANGE TEST

Step 1. Arrange the means in order of magnitude

Step 2. Find the standard error of a single mean by means of the formula.

\[ S_x = \sqrt{\frac{s}{n}} \]

where \( s \) = square root of within treatment mean square (MS_w) of the analysis of variance

and \( n \) = number of observations on which each of the means is based

In the present example the data are

\[ S_x = \frac{7.639}{36} = \frac{7.639}{6} = 1.273 \]

Step 3. With 136 d.f. and 5 means we enter Table Xc of Edwards' Experimental Design in Psychological Research. Third Edition (13) in order to establish the significant studentized ranges

Means

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sig. student. ranges</td>
<td>3.702</td>
<td>3.858</td>
<td>3.965</td>
<td>4.044</td>
</tr>
</tbody>
</table>

Step 4. Each significant studentized range is now multiplied by the standard error of the mean in order to find the shortest significant ranges. These shortest significant ranges \( (R_2, R_3, \text{etc.)} \) are recorded at the right of Table 4 for easy reference.
Appendix L

SUMMARY OF CHI SQUARE

EXPERIMENTAL VS CONTROL AND QUIT VS DID NOT QUIT
\( (T_2, T_3, T_4, T_5) \)

<table>
<thead>
<tr>
<th></th>
<th>QUIT</th>
<th>DID NOT QUIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>T_2</td>
<td>CONTROL</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>EXPER.</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>CHI SQUARE = 1.80, ( p &lt; .05 )</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>QUIT</th>
<th>DID NOT QUIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>T_3</td>
<td>CONTROL</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>EXPER.</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>CHI SQUARE = 1.80, ( p &lt; .05 )</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>QUIT</th>
<th>DID NOT QUIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>T_4, T_5</td>
<td>CONTROL</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>EXPER.</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>CHI SQUARE = 0.50, ( p &lt; .05 )</td>
<td></td>
</tr>
</tbody>
</table>
Dear

Please accept my thanks for your participation in the Smoking Cessation Research Study. Please find enclosed the following documents:

1. Subject Consent Form
2. Physician's Consent Form (to be completed by your physician if you are 35 years or over)
3. Physical Activity Readiness Questionnaire - PAR-Q (to be completed by you if you are under 35)

It would be appreciated if you would return the Subject Consent Form and the appropriate other form together with your cheque for $25. Your cheque should be payable to "J. Stanley Hill - Smoking Research Project." These items should be mailed as soon as possible to: Prof. J. S. Hill, Thames Hall, University of Western Ontario, London, Ontario, N6A 3K7.

Once I have received these forms and your cheque for $25, I will be telephoning you to set up your appointment for the first testing session. Once again, please accept my sincere thanks for volunteering to participate in this research study.

Sincerely yours,

J. Stanley Hill
Associate Professor

JSH/jam
Appendix N

University of Western Ontario
Faculty of Physical Education

Subject Consent Form

I hereby volunteer to be a subject in the Smoking Cessation Research Study.

Bicycle ergometer exercise test

The prediction of my maximal work capacity involves pedalling at a predetermined speed and resistance for 3-4 minutes at each of 2-4 different workloads. Heart rate will be recorded at each workload. The test will be terminated (a) when I decide to stop for any reason or (b) when my heart rate reaches the maximal heart rate for my age minus 15-20 beats.

As the test progresses, I understand that increased heart rate, sweating and fatigue are all normal effects of exercise.

Because of the linear relationship between heart rate and workload maximal work capacity can be estimated using the heart rate data obtained during the exercise test.

Other tests to be administered

- Self Motivation Inventory - a questionnaire
- Your body weight will be measured
- Your resting heart rate will be established
- A sample of your exhaled air will be analyzed for carbon monoxide level.

Risks and discomforts

There are no risks involved with any of these test procedures. Some mild discomfort from muscle soreness may be felt after the exercise test.
Appendix N (continued)

Groups

I understand that subjects will be randomly assigned to one of two groups:

- Group A will receive a group counselling approach to smoking cessation therapy
- Group B will receive group counselling plus a graduated physical activity program.

I understand that if I am assigned to Group A, I will be required to limit my physical activity during the five week period to that engaged in presently. I further understand that if I am assigned to Group B I will be required to increase my level of physical activity to the best of my ability during the five week period.

Deposit

I understand that a $25. deposit is required and is refundable as follows:

(a) if I am no longer smoking at the end of the five week period, $10. will be returned.
(b) if I am still not smoking at the end of the one month follow-up period, the balance of $15. will be refunded.

I understand that if I lose any part of my deposit it will be given as a donation to the London and Middlesex Lung Association and an appropriate income tax receipt issued.

Confidentiality

I am aware that the results of my tests will be held in the strictest confidence and will not be revealed to anyone but may be used for scientific purposes provided my privacy is maintained.

Signature: _______________________
Name: _______________________
(please print)
Date: _______________________

### TABLE 3. SUMMARY TABLE OF ANALYSIS OF VARIANCE.
SMOKING BEHAVIOUR SCORE, T₁ - T₅

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>SS</th>
<th>DF</th>
<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>BETWEEN SUBJECTS</td>
<td>26108.9500</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROUPS (A)</td>
<td>271.3389</td>
<td>1</td>
<td>271.3389</td>
<td>.357</td>
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<tr>
<td>SUBJECTS WITHIN GROUP</td>
<td>25837.6111</td>
<td>34</td>
<td>759.9297</td>
<td></td>
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<tr>
<td>WITHIN SUBJECTS</td>
<td>21404.0000</td>
<td>144</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIME (B)</td>
<td>12835.4222</td>
<td>4</td>
<td>3208.8556</td>
<td>54.990</td>
</tr>
<tr>
<td>AB</td>
<td>632.5778</td>
<td>4</td>
<td>158.1444</td>
<td>2.710</td>
</tr>
<tr>
<td>SUBJECTS WITHIN GROUPS OVER TIME</td>
<td>7936.0000</td>
<td>136</td>
<td>58.3529</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>47512.9500</td>
<td>179</td>
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</table>
### TABLE 4. SMOKING BEHAVIOUR SCORES.
**COLLAPSED MEANS OVER TIME.**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
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</thead>
<tbody>
<tr>
<td>EXPERIMENTAL</td>
<td>34.611</td>
<td>4.722</td>
<td>8.611</td>
<td>15.278</td>
<td>16.389</td>
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<tr>
<td>CONTROL</td>
<td>30.222</td>
<td>10.556</td>
<td>14.444</td>
<td>17.222</td>
<td>19.444</td>
</tr>
<tr>
<td>TOTAL</td>
<td>32.417</td>
<td>7.639</td>
<td>11.528</td>
<td>16.250</td>
<td>17.917</td>
</tr>
</tbody>
</table>

### TABLE 5. SUMMARY TABLE - DUNCAN'S MULTIPLE RANGE TEST.
**SMOKING BEHAVIOUR SCORES OVER TIME.**

<table>
<thead>
<tr>
<th></th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T1</th>
</tr>
</thead>
<tbody>
<tr>
<td>T2 -</td>
<td>7.639</td>
<td>3.89</td>
<td>8.610</td>
<td>10.280</td>
<td>24.780</td>
</tr>
<tr>
<td>T3 -</td>
<td>11.528</td>
<td>4.720</td>
<td>6.390</td>
<td>20.890</td>
<td>R³ = 4.911</td>
</tr>
<tr>
<td>T4 -</td>
<td>16.250</td>
<td>1.670</td>
<td>16.170</td>
<td>R⁴ = 5.047</td>
<td></td>
</tr>
<tr>
<td>T5 -</td>
<td>17.917</td>
<td>14.500</td>
<td>R⁵ = 5.148</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any two means not underscored by the same line are significantly different.
Any two means underscored by the same line are not significantly different.
### TABLE 6. SUMMARY TABLE OF ANALYSIS OF VARIANCE.  
**AGE STARTED SMOKING SCORES. (T₂, T₃, T₄, T₅)**

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>DF</th>
<th>Mean Sq.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Group (A)</td>
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<td>5.568</td>
<td>.789</td>
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<td>Smok. Beh. (B)</td>
<td>16.118</td>
<td>1</td>
<td>16.118</td>
<td>2.284</td>
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<tr>
<td>AB</td>
<td>14.507</td>
<td>1</td>
<td>14.507</td>
<td>2.055</td>
</tr>
<tr>
<td>Residual</td>
<td>225.875</td>
<td>32</td>
<td>7.059</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>258.750</td>
<td>35</td>
<td>7.393</td>
<td></td>
</tr>
<tr>
<td><strong>T₃</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Group (A)</td>
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<td>1</td>
<td>3.506</td>
<td>.495</td>
</tr>
<tr>
<td>Smok. Beh. (B)</td>
<td>3.368</td>
<td>1</td>
<td>3.368</td>
<td>.476</td>
</tr>
<tr>
<td>AB</td>
<td>26.532</td>
<td>1</td>
<td>26.532</td>
<td>3.747</td>
</tr>
<tr>
<td>Residual</td>
<td>226.600</td>
<td>32</td>
<td>7.081</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>258.750</td>
<td>35</td>
<td>7.393</td>
<td></td>
</tr>
<tr>
<td><strong>T₄, T₅</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group (A)</td>
<td>2.678</td>
<td>1</td>
<td>2.678</td>
<td>.402</td>
</tr>
<tr>
<td>Smok. Beh. (B)</td>
<td>1.553</td>
<td>1</td>
<td>1.553</td>
<td>.233</td>
</tr>
<tr>
<td>AB</td>
<td>41.961</td>
<td>1</td>
<td>41.961</td>
<td>6.304</td>
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<td>Residual</td>
<td>212.986</td>
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<td>6.656</td>
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<td>Total</td>
<td>258.750</td>
<td>35</td>
<td>7.393</td>
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</tr>
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</table>
TABLE 7. SUMMARY TABLE OF ANALYSIS OF VARIANCE.
NUMBER OF YEARS SMOKED. (T₂,T₃,T₄,T₅)

<table>
<thead>
<tr>
<th>T₂ SOURCE</th>
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<th>DF</th>
<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP (A)</td>
<td>243.734</td>
<td>1</td>
<td>243.734</td>
<td>3.334</td>
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<tr>
<td>SMOK. BEH. (B)</td>
<td>90.645</td>
<td>1</td>
<td>90.645</td>
<td>1.240</td>
</tr>
<tr>
<td>AB</td>
<td>1.491</td>
<td>1</td>
<td>1.491</td>
<td>0.020</td>
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<tr>
<td>RESIDUAL</td>
<td>2339.475</td>
<td>32</td>
<td>73.109</td>
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</tr>
<tr>
<td>TOTAL</td>
<td>2622.972</td>
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<td>74.942</td>
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<table>
<thead>
<tr>
<th>T₃ SOURCE</th>
<th>SS</th>
<th>DF</th>
<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP (A)</td>
<td>278.916</td>
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<td>4.010</td>
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<tr>
<td>SMOK. BEH. (B)</td>
<td>206.690</td>
<td>1</td>
<td>206.690</td>
<td>2.973</td>
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<tr>
<td>AB</td>
<td>0.021</td>
<td>1</td>
<td>0.021</td>
<td>0.090</td>
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<tr>
<td>RESIDUAL</td>
<td>2224.900</td>
<td>32</td>
<td>69.528</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>2622.972</td>
<td>35</td>
<td>74.942</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>T₄,T₅ SOURCE</th>
<th>SS</th>
<th>DF</th>
<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP (A)</td>
<td>220.211</td>
<td>1</td>
<td>220.211</td>
<td>3.243</td>
</tr>
<tr>
<td>SMOK. BEH. (B)</td>
<td>87.531</td>
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<td>87.531</td>
<td>1.289</td>
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<tr>
<td>AB</td>
<td>171.114</td>
<td>1</td>
<td>171.114</td>
<td>2.520</td>
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<tr>
<td>RESIDUAL</td>
<td>2172.966</td>
<td>32</td>
<td>67.905</td>
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</tr>
<tr>
<td>TOTAL</td>
<td>2622.972</td>
<td>35</td>
<td>74.942</td>
<td></td>
</tr>
<tr>
<td>T&lt;sub&gt;2&lt;/sub&gt; SOURCE</td>
<td>SS</td>
<td>DF</td>
<td>MEAN SQ.</td>
<td>F</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------</td>
<td>----</td>
<td>----------</td>
<td>-----</td>
</tr>
<tr>
<td>GROUP (A)</td>
<td>2.922</td>
<td>1</td>
<td>2.922</td>
<td>.003</td>
</tr>
<tr>
<td>SMOK. BEH. (B)</td>
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<td>174.809</td>
<td>.184</td>
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<tr>
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<td>1274.178</td>
<td>1</td>
<td>1274.178</td>
<td>1.342</td>
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<tr>
<td>RESIDUAL</td>
<td>24690.262</td>
<td>26</td>
<td>949.625</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>26149.367</td>
<td>29</td>
<td>901.702</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T&lt;sub&gt;3&lt;/sub&gt; SOURCE</th>
<th>SS</th>
<th>DF</th>
<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP (A)</td>
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<td>3.175</td>
<td>.003</td>
</tr>
<tr>
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<td>1174.772</td>
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<td>AB</td>
<td>165.102</td>
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<td>165.102</td>
<td>.173</td>
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<td>RESIDUAL</td>
<td>24799.375</td>
<td>26</td>
<td>953.822</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>26149.367</td>
<td>29</td>
<td>901.702</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>T&lt;sub&gt;4&lt;/sub&gt; T&lt;sub&gt;5&lt;/sub&gt; SOURCE</th>
<th>SS</th>
<th>DF</th>
<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP (A)</td>
<td>.614</td>
<td>1</td>
<td>.614</td>
<td>.001</td>
</tr>
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<td>494.121</td>
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<td>.502</td>
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<td>.067</td>
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<tr>
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<td>983.806</td>
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</tr>
<tr>
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<td>29</td>
<td>901.702</td>
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</tr>
</tbody>
</table>
## Table 9. Summary Table of Analysis of Variance

**Self Motivation Inventory ($T_2$, $T_3$, $T_4$, $T_5$)**

### $T_2$

<table>
<thead>
<tr>
<th>Source</th>
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<th>F</th>
</tr>
</thead>
<tbody>
<tr>
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<td>882.213</td>
<td>1.999</td>
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<td>5912.458</td>
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<td>5912.458</td>
<td>12.797</td>
</tr>
<tr>
<td>AB</td>
<td>691.612</td>
<td>1</td>
<td>691.612</td>
<td>1.497</td>
</tr>
<tr>
<td>Residual</td>
<td>14784.875</td>
<td>32</td>
<td>462.027</td>
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</tr>
<tr>
<td>Total</td>
<td>21553.639</td>
<td>35</td>
<td>615.818</td>
<td></td>
</tr>
</tbody>
</table>

### $T_3$

<table>
<thead>
<tr>
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<th>DF</th>
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<th>F</th>
</tr>
</thead>
<tbody>
<tr>
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<td>824.772</td>
<td>1.685</td>
</tr>
<tr>
<td>Smoking Beh. (B)</td>
<td>5255.579</td>
<td>1</td>
<td>5255.579</td>
<td>10.737</td>
</tr>
<tr>
<td>AB</td>
<td>470.007</td>
<td>1</td>
<td>470.007</td>
<td>0.960</td>
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<tr>
<td>Residual</td>
<td>15663.358</td>
<td>32</td>
<td>489.480</td>
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</tr>
<tr>
<td>Total</td>
<td>21553.639</td>
<td>35</td>
<td>615.818</td>
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</tr>
</tbody>
</table>

### $T_4$, $T_5$

<table>
<thead>
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<th>SS</th>
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<th>F</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>AB</td>
<td>41.477</td>
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<td>41.477</td>
<td>0.074</td>
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<tr>
<td>Residual</td>
<td>17828.687</td>
<td>32</td>
<td>557.146</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21553.639</td>
<td>35</td>
<td>615.818</td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>SS</td>
<td>DF</td>
<td>Mean Sq.</td>
<td>F</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>--------</td>
<td>----</td>
<td>----------</td>
<td>------</td>
</tr>
<tr>
<td>QUIT VS DID NOT QUIT (A)</td>
<td>661.012</td>
<td>1</td>
<td>661.012</td>
<td>3.333</td>
</tr>
<tr>
<td>EXPERIMENTAL VS CONTROL (B)</td>
<td>209.248</td>
<td>1</td>
<td>209.248</td>
<td>1.055</td>
</tr>
<tr>
<td>AxB</td>
<td>61.992</td>
<td>1</td>
<td>61.992</td>
<td>.312</td>
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<tr>
<td></td>
<td>6346.039</td>
<td>32</td>
<td>198.313</td>
<td></td>
</tr>
<tr>
<td>TIME (D)</td>
<td>245.847</td>
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<td>245.847</td>
<td>40.552</td>
</tr>
<tr>
<td>AxD</td>
<td>9.744</td>
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<td>1.607</td>
</tr>
<tr>
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<td>0.573</td>
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<tr>
<td>AxBxD</td>
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<td>1.177</td>
<td>0.194</td>
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<tr>
<td></td>
<td>193.997</td>
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<td>6.062</td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>SS</td>
<td>DF</td>
<td>Mean Sq.</td>
<td>F</td>
</tr>
<tr>
<td>QUIT VS DID NOT QUIT (A)</td>
<td>3047.586</td>
<td>1</td>
<td>3047.586</td>
<td>6.174</td>
</tr>
<tr>
<td>EXPERIMENTAL VS CONTROL (B)</td>
<td>26.005</td>
<td>1</td>
<td>26.005</td>
<td>0.053</td>
</tr>
<tr>
<td>AxB</td>
<td>364.113</td>
<td>1</td>
<td>364.113</td>
<td>.737</td>
</tr>
<tr>
<td></td>
<td>15796.744</td>
<td>32</td>
<td>493.648</td>
<td></td>
</tr>
<tr>
<td>TIME (D)</td>
<td>551.755</td>
<td>4</td>
<td>137.938</td>
<td>35.344</td>
</tr>
<tr>
<td>AxD</td>
<td>147.226</td>
<td>4</td>
<td>36.806</td>
<td>9.431</td>
</tr>
<tr>
<td>BXD</td>
<td>27.230</td>
<td>4</td>
<td>6.807</td>
<td>1.744</td>
</tr>
<tr>
<td>AxBxD</td>
<td>4.183</td>
<td>4</td>
<td>1.045</td>
<td>0.268</td>
</tr>
<tr>
<td></td>
<td>499.549</td>
<td>128</td>
<td>3.902</td>
<td></td>
</tr>
</tbody>
</table>
**TABLE 11. SUMMARY TABLE OF ANALYSIS OF VARIANCE.**
**MAXIMUM OXYGEN INTAKE (T<sub>1</sub>-T<sub>2</sub>, T<sub>1</sub>-T<sub>5</sub>).**

### T<sub>1</sub>-T<sub>2</sub>

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>SS</th>
<th>DF</th>
<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUIT VS DID NOT QUIT (A)</td>
<td>272.824</td>
<td>1</td>
<td>272.824</td>
<td>5.540</td>
</tr>
<tr>
<td>EXPERIMENTAL VS CONTROL (B)</td>
<td>3.965</td>
<td>1</td>
<td>3.965</td>
<td>.081</td>
</tr>
<tr>
<td>AxB</td>
<td>29.950</td>
<td>1</td>
<td>29.950</td>
<td>.608</td>
</tr>
<tr>
<td></td>
<td>1575.746</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIME (D)</td>
<td>20.494</td>
<td>1</td>
<td>20.494</td>
<td>13.861</td>
</tr>
<tr>
<td>AxD</td>
<td>.186</td>
<td>1</td>
<td>.186</td>
<td>.126</td>
</tr>
<tr>
<td>BxD</td>
<td>8.776</td>
<td>1</td>
<td>8.776</td>
<td>5.936</td>
</tr>
<tr>
<td>AxBxD</td>
<td>.450</td>
<td>1</td>
<td>.450</td>
<td>.305</td>
</tr>
<tr>
<td></td>
<td>47.311</td>
<td>32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### T<sub>1</sub>-T<sub>5</sub>

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>SS</th>
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<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUIT VS DID NOT QUIT (A)</td>
<td>22.572</td>
<td>1</td>
<td>22.572</td>
<td>.153</td>
</tr>
<tr>
<td>EXPERIMENTAL VS CONTROL (B)</td>
<td>291.508</td>
<td>1</td>
<td>291.508</td>
<td>1.976</td>
</tr>
<tr>
<td>AxB</td>
<td>22.298</td>
<td>1</td>
<td>22.298</td>
<td>.151</td>
</tr>
<tr>
<td></td>
<td>4719.087</td>
<td>32</td>
<td>147.471</td>
<td></td>
</tr>
<tr>
<td>TIME (D)</td>
<td>37.306</td>
<td>4</td>
<td>9.326</td>
<td>8.343</td>
</tr>
<tr>
<td>AxD</td>
<td>11.380</td>
<td>4</td>
<td>2.845</td>
<td>2.545</td>
</tr>
<tr>
<td>BxD</td>
<td>52.061</td>
<td>4</td>
<td>13.015</td>
<td>11.642</td>
</tr>
<tr>
<td>AxBxD</td>
<td>143.086</td>
<td>128</td>
<td>1.117</td>
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</tr>
</tbody>
</table>
**TABLE 12. SUMMARY TABLE OF ANALYSIS OF VARIANCE.**

**BODY WEIGHT. \((T_1-T_2, T_1-T_5)\)**

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>SS</th>
<th>DF</th>
<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUIT VS DID NOT QUIT (A)</td>
<td>698.186</td>
<td>1</td>
<td>698.186</td>
<td>3.743</td>
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<tr>
<td>EXPERIMENTAL VS CONTROL (B)</td>
<td>298.422</td>
<td>1</td>
<td>298.422</td>
<td>1.599</td>
</tr>
<tr>
<td>AxB</td>
<td>33.850</td>
<td>1</td>
<td>33.850</td>
<td>.181</td>
</tr>
<tr>
<td>5968.523</td>
<td>32</td>
<td>186.516</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>TIME (D)</th>
<th>SS</th>
<th>DF</th>
<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.304</td>
<td>1</td>
<td></td>
<td>7.304</td>
<td>11.664</td>
</tr>
<tr>
<td>AxD</td>
<td>2.186</td>
<td>1</td>
<td>2.185</td>
<td>3.489</td>
</tr>
<tr>
<td>BxD</td>
<td>2.210</td>
<td>1</td>
<td>2.210</td>
<td>3.530</td>
</tr>
<tr>
<td>AxBxD</td>
<td>.410</td>
<td>1</td>
<td>.410</td>
<td>.655</td>
</tr>
<tr>
<td>20.038</td>
<td>32</td>
<td></td>
<td>.626</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>SS</th>
<th>DF</th>
<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUIT VS DID NOT QUIT (A)</td>
<td>639.618</td>
<td>1</td>
<td>639.618</td>
<td>1.311</td>
</tr>
<tr>
<td>EXPERIMENTAL VS CONTROL (B)</td>
<td>767.538</td>
<td>1</td>
<td>767.538</td>
<td>1.574</td>
</tr>
<tr>
<td>AxB</td>
<td>568.692</td>
<td>1</td>
<td>568.692</td>
<td>1.166</td>
</tr>
<tr>
<td>15602.557</td>
<td>32</td>
<td>487.579</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TIME (D)</th>
<th>SS</th>
<th>DF</th>
<th>MEAN SQ.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.300</td>
<td>4</td>
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<td>3.575</td>
<td>9.485</td>
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<td>4.469</td>
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<td>2.964</td>
</tr>
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<td>BxD</td>
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<td>.871</td>
<td>2.311</td>
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<tr>
<td>AxBxD</td>
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<td>.309</td>
<td>.820</td>
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<td>48.243</td>
<td>128</td>
<td></td>
<td>.376</td>
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</tr>
</tbody>
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