1984

Smoking Behaviour: The Influence Of Environmental Supports And Gender

Patricia Ann Bolla

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LA THÈSE A ÉTÉ MICROFILMÉE TEL QUE NOUS L'AVONS RÉCU
SMOKING BEHAVIOUR: THE INFLUENCE OF ENVIRONMENTAL SUPPORTS AND GENDER

by

Patricia A. Bolla

Department of Psychology

Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Faculty of Graduate Studies
The University of Western Ontario
London, Ontario
1984

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ABSTRACT

This investigation examined the effects on smoking of one social environmental support for smoking, one physical environmental support for smoking, and gender of the subject. The social environmental support for smoking was represented by the behaviour of a model who either smoked three cigarettes in the presence of the subject or refrained from smoking. The physical environmental support for smoking was the presence or absence of ashtrays.

The Model and Ashtray factors were combined to create four experimental conditions: (a) Nonsmoker Model + No Ashtray, (b) Nonsmoker Model + Ashtray, (c) Smoker Model + No Ashtray and, (d) Smoker Model + Ashtray.

Subjects for the investigation were 72 adult smokers (40 women, 32 men) employed full-time in the business community. Each subject was exposed to one of the four experimental conditions over a 45 minute observation period. During this time, subjects completed a series of paper and pencil questionnaires concerning their lifestyle and personality. Dependent measures of smoking behaviour included (a) number of cigarettes, (b) puffs per cigarette, (c) time until lighting the first cigarette, (d) duration
spent smoking each cigarette and, (e) interval between cigarettes.

Results indicated that the Model and Gender factors significantly influenced the number of cigarettes consumed during the observation period. Subjects smoked more cigarettes when exposed to a model who smoked than when exposed to a model who refrained from smoking ($p < .001$). Furthermore, women smoked at a higher rate than men ($p < .05$). Finally, the presence or absence of ashtrays failed to significantly influence smoking behaviour. In addition, there were no significant interactions between independent variables.

This study demonstrated that a social environmental support for smoking, such as the behaviour of another person, can influence the rate of smoking by an observer. However, evidence failed to support the prediction that a physical environmental support influences smoking rate. Preliminary evidence suggested that men and women may differ on the elicitation of smoking in particular situations. Results are discussed in relation to social learning theory and an ecological view of cigarette smoking. In addition, applications of results to the ecological management of smoking and smoking cessation are addressed.
ACKNOWLEDGEMENTS

Health & Welfare Canada and the Canadian Council on Smoking and Health are the organizations to which I am most indebted. Health & Welfare Canada provided generous financial support to myself and the project through its doctoral fellowship and research award program. I would particularly like to thank Kurt Baumgartner, past Executive Director of the Canadian Council on Smoking and Health, for his support, and assistance in the recruitment of companies in Ottawa, Ontario.

Metropolitan Life Insurance Company (National Head Office) and Gandalf Data Limited (National Head Office) were the two companies who participated in this study. Both management and employees willingly gave their time and co-operation. I thank both companies for their generosity, and genuine interest in this research.

I would also like to acknowledge the assistance of Mary Heath and Maurice Gallant, who acted as research assistants for the investigation.

Finally, I thank my advisor, David R. Evans, for his support and constructive criticism throughout the duration of this work.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CERTIFICATE OF EXAMINATION</td>
<td>ii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>v</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>viii</td>
</tr>
<tr>
<td>CHAPTER I - REVIEW OF THE LITERATURE</td>
<td></td>
</tr>
<tr>
<td>1. Overview</td>
<td>1</td>
</tr>
<tr>
<td>2. Smoking Cessation</td>
<td>3</td>
</tr>
<tr>
<td>3. Theories Concerning Environmental Influences on Smoking</td>
<td>17</td>
</tr>
<tr>
<td>4. Research Concerning Environmental Influences on Smoking</td>
<td>25</td>
</tr>
<tr>
<td>5. Gender and Environmental Influences on Smoking</td>
<td>39</td>
</tr>
<tr>
<td>6. Hypotheses</td>
<td>42</td>
</tr>
<tr>
<td>CHAPTER II - METHOD</td>
<td></td>
</tr>
<tr>
<td>1. Subjects</td>
<td>45</td>
</tr>
<tr>
<td>2. Measures</td>
<td>51</td>
</tr>
<tr>
<td>3. Conditions</td>
<td>61</td>
</tr>
<tr>
<td>4. Procedure</td>
<td>65</td>
</tr>
<tr>
<td>CHAPTER III - RESULTS</td>
<td></td>
</tr>
<tr>
<td>1. Measures of Smoking</td>
<td>72</td>
</tr>
<tr>
<td>2. Main Analyses</td>
<td>77</td>
</tr>
<tr>
<td>3. Effects of the Model</td>
<td>79</td>
</tr>
<tr>
<td>4. Effects of Gender</td>
<td>86</td>
</tr>
<tr>
<td>5. Effects of Ashtray</td>
<td>90</td>
</tr>
<tr>
<td>6. Interactions</td>
<td>91</td>
</tr>
<tr>
<td>7. Conclusions</td>
<td>95</td>
</tr>
</tbody>
</table>
CHAPTER IV - SECONDARY ANALYSES
1. Nonsmokers vs. Smokers .......................... 97
2. Personality, Reasons for Smoking, and Smoking Behaviour .................. 99
3. Gender Differences on Reasons for Smoking .... 104

CHAPTER V - DISCUSSION
1. Overview ........................................ 109
2. Measures of Smoking ................................ 114
3. Effects of Model, Gender, and Ashtray .................................. 117
4. Effects of the Model ................................ 120
5. Effects of Gender .................................... 128
6. Effects of Ashtray ................................... 133
7. Concluding Comments ................................ 136

* * * * * * *

APPENDIX 1. RECRUITMENT OF COMPANIES ................. 140
APPENDIX 2. RECRUITMENT OF SUBJECTS .................. 142
APPENDIX 3. DEMOGRAPHIC SHEET ....................... 145
APPENDIX 4. QUESTIONNAIRE PART I ..................... 146
APPENDIX 5. QUESTIONNAIRE PART II .................... 165
APPENDIX 6. TALLY SHEET .............................. 171
APPENDIX 7. SUMMARY TO SUBJECTS .................... 172

REFERENCES ........................................ 174
VITA ............................................. 185
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Review of Multicomponent Programs</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>Demographic Characteristics of Smokers</td>
<td>48</td>
</tr>
<tr>
<td>3</td>
<td>Self-reported Daily Cigarette Consumption</td>
<td>49</td>
</tr>
<tr>
<td>4</td>
<td>Company Differences</td>
<td>52</td>
</tr>
<tr>
<td>5</td>
<td>Intercorrelations Among Dependent Variables</td>
<td>74</td>
</tr>
<tr>
<td>6</td>
<td>Factor Loadings of Dependent Measures</td>
<td>76</td>
</tr>
<tr>
<td>7</td>
<td>Distribution of Cigarettes Smoked By Male and Female Subjects</td>
<td>78</td>
</tr>
<tr>
<td>8</td>
<td>Correlations Among Age, Years Smoking, and Cigarettes Per Day</td>
<td>80</td>
</tr>
<tr>
<td>9</td>
<td>Analysis of Covariance on Number of Cigarettes</td>
<td>81</td>
</tr>
<tr>
<td>10</td>
<td>Distribution of Smoking by Condition</td>
<td>83</td>
</tr>
<tr>
<td>11</td>
<td>Analysis of Covariance on Change</td>
<td>85</td>
</tr>
<tr>
<td>12</td>
<td>Breakdown of Dependent Measures By Gender</td>
<td>89</td>
</tr>
<tr>
<td>13</td>
<td>Correlations Between Personality and Total Puffs</td>
<td>101</td>
</tr>
<tr>
<td>14</td>
<td>Correlations Between Reasons For Smoking and Daily Cigarette Consumption</td>
<td>102</td>
</tr>
<tr>
<td>Page</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>15</td>
<td>Correlations Between Reasons For Smoking and Total Puffs</td>
<td>103</td>
</tr>
<tr>
<td>16</td>
<td>Gender Differences on Reasons For Smoking</td>
<td>105</td>
</tr>
<tr>
<td>17</td>
<td>Gender Differences on Items of the Reasons For Smoking Scale</td>
<td>106</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>1</td>
<td>Factorial Design of the Conditions Model $X$ Gender $X$ Ashtray</td>
<td>63</td>
</tr>
</tbody>
</table>
CHAPTER 1

REVIEW OF THE LITERATURE

Overview

The environment of the smoker typically has been regarded as influential in the initiation and maintenance of cigarette smoking. Traditionally, relationships between the environment and smoking have been assumed rather than demonstrated empirically (Frederiksen, 1979; Herman, 1974; Lichtenstein, 1977, 1979, 1982; Pechacek, 1979). In recent years, however, a growing number of researchers have addressed the need to understand the specific role which the individual’s environment plays in the continuance of smoking. Moreover, they have advocated studies which focus on such topics as social contexts of smoking, relationships between situational cues and smoking pattern, and individual differences with respect to the foregoing (Frederiksen, 1979; Lichtenstein, 1979, 1982; Pechacek, 1979; Pomerleau, Adkins & Pertshuck, 1978; Shiffman, 1982).

Growing interest in the issue of environmental influences on smoking has not, however, been accompanied by an advancement in theory which incorporates various types of
influences (e.g., pharmacological, psychological, physiological, environmental) into a comprehensive conceptualization of the maintenance of smoking behaviour. The merit of such a conceptualization would be its potential to generate hypotheses to be tested regarding the impact of individual factors and/or their combinations on smoking behaviour. A conceptualization of this kind would ultimately lead to a more refined appreciation of the dynamics of smoking than currently provided by univariate explanations of smoking behaviour. The development of a broad based model of smoking and subsequent testing of hypothesized relationships between many factors and smoking pattern would, of course, be a task of considerable magnitude.

A preliminary step which would mark a considerable advancement in the field at this time is a smaller scale investigation which demonstrates whether specific environmental variables do, in fact, influence an individual's smoking pattern. A small scale investigation can still address the issue of whether environmental factors interact with each other, or with additional types of factors (e.g., gender) to influence cigarette smoking. The questions raised in this study thus mirror those which would be raised by a comprehensive investigation of smoking.
behaviour; however, they are addressed by means of a relatively restricted approach.

The following sections of this chapter serve to place the investigation in an historical perspective and to set forth the rationale for the selection of the three factors which represented the focus of study (a social environmental factor, a physical environmental factor, gender).

THE ENVIRONMENT AND SMOKING

Smoking Cessation

A brief overview of major advances in smoking cessation research can serve to highlight the need to focus increased attention on the potential contribution of environmental factors to the maintenance of an individual's smoking behaviour.

Programs designed to eliminate cigarette smoking have generally resulted in moderate success rates at termination of treatment and low success rates three to six months after treatment. The failure of cessation techniques to exact long-term abstinence from smoking is consistently documented by numerous reviews of the modification literature (Brengelmann & Sedlmayr, 1977; Hunt & Bespalec, 1974; Lichtenstein & Danahe, 1977; McFall & Hammen, 1971;
Pechacek, 1979; Schwartz & Rider, 1977). Until recently, cessation techniques usually employed unitary strategies. For example, a single intervention such as rapid smoking (i.e., smoking a cigarette quickly until becoming nauseous or faint) would be used with the client. Briefly, the main results which consistently emerged from evaluations of unitary cessation techniques were as follows:

1. Virtually any treatment program can be expected to produce a low-to-moderate success rate at termination (i.e., approximately 26% of clients abstinent; smoking rate reduced to 30% - 40% of baseline rate).

2. Less than one-third of those clients who are abstinent at termination of treatment are still abstinent three to six months later.

3. A return to smoking at approximately 75% of one's baseline rate is common three to six months posttreatment.

4. Abstinence rates for groups are seldom higher than 13% at follow-up.

The striking uniformity in results across studies is cogently summarized by Bernstein and McAlister (1976): "The good news is that almost any intervention can be effective in eliminating or drastically reducing smoking behavior. The bad news is that these changes tend to be
relatively short-lived . . . " (p. 89).

In response to the failure of unitary approaches to exact long-term success, multicomponent procedures have been developed during recent years. Basically, these procedures represent packages of techniques which combine various cessation techniques often reflecting different treatment approaches. For example, Danaher (1977) combined rapid smoking with instruction in self-control techniques. The various multicomponent procedures combine as few as two techniques (e.g., satiation + self-management) (Best, Owen & Trentadue, 1978) or as many as eight different strategies, (Elliot & Denney, 1978).

Although published reviews of single strategies are plentiful (Brengelmann & Sedlmayr, 1977; Hunt & Bespalec, 1976; Lando, 1977; Lichtenstein & Danaher, 1977; Pechcek, 1979), comprehensive reviews of multidimensional procedures have not yet appeared in the literature. Consequently, firm conclusions have not been reached concerning the contribution of this recent treatment approach.

Nevertheless, it is important to take a brief look at such programs in order to appreciate the continuing need to improve the effectiveness and generalization of current interventions.

Table 1 outlines 24 evaluation studies which were
<table>
<thead>
<tr>
<th>Authors</th>
<th>Conditions</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaver et al.</td>
<td>(nicotine fading + anxiety management) vs. (nicotine fading)</td>
<td>- 1, 3, 6 month follow-up [F]</td>
</tr>
<tr>
<td>(1981)</td>
<td></td>
<td>- no treatment differences</td>
</tr>
<tr>
<td>Best et al.</td>
<td>(saturation + self-mgt.) vs. (rapid smoking + self-mgt.)</td>
<td>- 1, 2, 6 month [F]</td>
</tr>
<tr>
<td>(1978)</td>
<td>vs. (combined)</td>
<td>- no treatment differences</td>
</tr>
<tr>
<td>Blittner et al.</td>
<td>(cognitive self-control + training) vs. (training)</td>
<td>- 3, 6 month [F]</td>
</tr>
<tr>
<td>(1978)</td>
<td>vs. (waiting list control)</td>
<td>- no treatment differences</td>
</tr>
<tr>
<td>Bornstein et al.</td>
<td>package of 8 components</td>
<td>- 6 month [F]</td>
</tr>
<tr>
<td>(1977)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brockway et al.</td>
<td>(several nonaversive) vs. (no treatment control)</td>
<td>- 12 month [F]</td>
</tr>
<tr>
<td>(1977)</td>
<td></td>
<td>- no treatment differences</td>
</tr>
<tr>
<td>Chapman et al.</td>
<td>(shock + self-mgt.)</td>
<td>- 12 month [F]</td>
</tr>
<tr>
<td>(1971)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coletti et al.</td>
<td>several nonaversive</td>
<td>- 1, 2, 3, 4 yr. [F]</td>
</tr>
<tr>
<td>(1983)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conway (1977)</td>
<td>factorial self-mgt. x aversive conditioning - placebo and no apply control</td>
<td>- 2, 5 month [F]</td>
</tr>
<tr>
<td></td>
<td>groups</td>
<td>- no reductions beyond placebo</td>
</tr>
<tr>
<td>Authors</td>
<td>Conditions</td>
<td>Results</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Danaher (1977)</td>
<td>(rapid smoking + self-control) vs. (rapid smoking) vs. (self-control) vs. (placebo)</td>
<td>- 3 month [F] no treatment differences from placebo package worse than unitary</td>
</tr>
<tr>
<td>Delahunt &amp; Curran (1976)</td>
<td>(neg. practice) vs. (self-control) vs. (combined) vs. (waiting list) vs. (placebo)</td>
<td>- 1,3,6 month [F] all groups superior to waiting list combined best at 6 months</td>
</tr>
<tr>
<td>Elliot &amp; Denney (1978)</td>
<td>(8 components) vs. (rapid smoking) vs. (placebo)</td>
<td>- 3,6 month [F] at 6 months, superior</td>
</tr>
<tr>
<td>Fox (1979)</td>
<td>(nicotine fading) vs. (self-monitoring) vs. (combined) vs. (American Cancer Society)</td>
<td>-1,3,6,12,18 mo. [F] at 18 months, combined superior</td>
</tr>
<tr>
<td>Hackett &amp; Horan (1977)</td>
<td>(rapid smoking + several behavioral)</td>
<td>- 6 month [F]</td>
</tr>
<tr>
<td>Hackett &amp; Horan (1978a)</td>
<td>(rapid smoking + several behavioral)</td>
<td>- 6 month [F]</td>
</tr>
<tr>
<td>Hackett &amp; Horan (1978b)</td>
<td>(focused smoking + several behavioral)</td>
<td>- 1,3,6 mo. [F]</td>
</tr>
<tr>
<td>Hackett &amp; Horan (1979)</td>
<td>(counseling) vs. (focused smoking) vs. (combined)</td>
<td>- 1,3,6 mo. [F]</td>
</tr>
</tbody>
</table>
Table 1 (continued)

<table>
<thead>
<tr>
<th>Authors</th>
<th>Conditions</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamilton &amp; Bornstein</td>
<td>(package) vs. (package + social support) vs. (package + social support + para-professional training) vs. (placebo) vs. (waiting list)</td>
<td>- 1, 3, 6, mo. [F] - at 6 months, no treatment differences from placebo</td>
</tr>
<tr>
<td>Lando (1977)</td>
<td>(satiation) vs. (satiation + booster sessions)</td>
<td>- 1, 4, 6 mo. [F] - package better at 6 mo.</td>
</tr>
<tr>
<td>Lando (1981)</td>
<td>(satiation + stimulus control) vs. (satiation + stimulus control + boosters)</td>
<td>- 3, 4, 6 mo. [F] - no treatment differences</td>
</tr>
<tr>
<td>Lando (1982)</td>
<td>(multistage package) vs. (single stage package)</td>
<td>- 2 wk., 1, 2, 3, 4, 6, 9, 12 month [F] - at 12 months, no treatment differences</td>
</tr>
<tr>
<td>Lando &amp; McCullough (1978)</td>
<td>(aversive + nonaversive package)</td>
<td>- 1, 4, 6 mo. [F]</td>
</tr>
<tr>
<td>McGrath &amp; Hall (1976)</td>
<td>(self-mgt.) vs. (self-mgt. + social reinforcement) vs. (no treatment)</td>
<td>- 3 mo. [F] - at 3 months, package superior</td>
</tr>
<tr>
<td>Murray &amp; Hobbs (1981)</td>
<td>(self-reinforcement) vs. (self-punishment) vs. (combined) vs. (placebo) vs. (no treatment)</td>
<td>- 3 mo., 3 yr. [F] - at 3 yr. self-punishment superior</td>
</tr>
<tr>
<td>Nepps (1984)</td>
<td>nonaversive + aversive package</td>
<td>- 6 month [F]</td>
</tr>
</tbody>
</table>
conducted to determine the effectiveness of a variety of multicomponent programs. The studies were published between 1971 and 1984, with most studies appearing during the late 1970's. There are at least three important questions which need to be answered in order to judge the value of multicomponent procedures. Are multicomponent programs more effective than unitary strategies? Is a particular combination of techniques superior to others? Finally, are multicomponent programs more effective than control groups?

Unfortunately, these questions are difficult to answer with any degree of certainty. As can be seen from Table 1, only eight studies even addressed the question of whether multicomponent programs are superior to unitary strategies. Five of those studies reported either no difference or a poorer outcome for subjects in multicomponent treatment groups compared to those exposed to a single strategy (Beaver et al., 1981; Blittner et al., 1978; Danaher, 1977; Delahunt & Curran, 1976; Murray & Hobbs, 1981). Although there is some evidence to support the superiority of multidimensional programs over single techniques, this issue must be clarified by controlled studies which compare relative effectiveness.

Secondly, five of the evaluation studies addressed the issue of whether particular multicomponent programs are-
superior to others (Best et al., Conway, 1977; Hamilton & Bornstein, 1979; Lando, 1981, 1982). Results indicated no differential effectiveness across programs. That is to say, the number and type of components did not differentially affect outcome measures.

Finally, nine studies were split on the question of whether multicomponent approaches are more effective than control groups. Four multicomponent programs did produce better long-term results (i.e., minimum follow-up of 3 months) than control groups (Delahunt & Curran, 1977; Elliot & Denney, 1978; McGrath & Hall, 1976; Murray & Hobbs, 1981). This is a very promising result given the fact that unitary techniques have consistently failed to demonstrate such superiority.

In summary, the use of multicomponent intervention techniques appears a promising alternative to unitary strategies at least with respect to long-term effectiveness. Nevertheless, the ability of particular combinations of strategies to produce superior results to other combinations, or to control groups, remains to be demonstrated.

Methodological problems inherent in smoking cessation research continue to limit the formation of solid conclusions regarding the merits of particular intervention
programs. As can be seen from Table 1, multicomponent procedures encompass a wide range of techniques which are used in various combinations with minimal replication. To further cloud the issue, studies vary substantially in terms of outcome measures (e.g., number of cigarettes per day, percentage of abstinent clients, percentage of baseline smoking rate), comparison points (e.g., pre/post, post/follow-up, pre-follow-up) and comparison groups (e.g., no comparison group, attention-placebo controls, waiting list controls, other treatment groups). Moreover, a recent survey of smoking cessation articles concluded that authors typically provide insufficient measurement details to enable others to replicate treatment programs (Shipley, Williams & Rosen, 1982).

In addition, investigators have failed to establish conventions for the measurement of abstinence at follow-up and, vary considerably with respect to the classification of subjects who smoke temporarily or switch to other tobacco products (Shipley et al., 1982). This inconsistency complicates interpretation of outcome results across studies. In an extensive methodological critique, McFall (1978) concluded that smoking cessation research characteristically has been plagued with such shortcomings as high attrition, short follow-up periods, lack of
appropriate controls, and unreliable measures of smoking. The problems outlined above impede not only the evaluation of particular cessation programs but also their replication.

It is with the above considerations in mind that the utility of continued smoking cessation research must be questioned. During the years since publication of the first Surgeon General's report on smoking and health (U. S. Department of Health, Education, and Welfare [USDHEW], 1964), there has been considerable expenditure of both time and money toward smoking cessation research. However, this investment has neither produced clear results concerning effective treatment techniques nor substantially advanced an understanding of cigarette smoking. Cessation research has demonstrated that temporary reduction and abstinence are not difficult to achieve for most clients. Furthermore, the limited long-term success rates of intervention programs have highlighted the complexity and tenacity of the phenomenon. Beyond this, cessation research has exerted a relatively minor impact on the field considering the multitude of studies and the small sector of the smoking population that actually seeks treatment. Although the majority of smokers report a desire to stop smoking (U. S. Public Health Service [USPHS], 1975), cessation programs chronically suffer from low enrollment. For example, a free
intervention program designed for pregnant women attracted only one of 43 women who had stated that they not only wished to stop smoking but also wished to receive treatment (Hughes, Epstein, Andrasik & Neff, 1982).

The major goal of smoking intervention programs has been to assist clients in stopping cigarette smoking. However, there are at least two flaws associated with this goal. First, it has been assumed that effective intervention programs can be developed without an understanding of those factors which maintain smoking and induce relapse. Secondly, it has been assumed that complete abstinence is a relevant and attainable goal for all clients. At this point in time, it is evident that continued investment in smoking cessation research is not warranted until there is a substantial improvement in knowledge concerning smoking behaviour and also a re-assessment of goals which can realistically be attained with a treatment population.

The maintenance of nonsmoking behaviour after completion of treatment is a chronic problem for clients even when they have experienced success during treatment. Therefore, research should be attempting to identify those influential factors which affect smoking behaviour in order to facilitate the development of effective counter measures.
For example, environmental factors associated with smoking operate on a number of levels in the individual's daily life and thus can support the continuance of cigarette smoking. At a societal level, cigarette smoking is an acceptable behaviour. Moreover, the product is readily available to the consumer at a moderate cost. At a situational level, ashtrays frequently are located in the subject's milieu and the smoker is regularly exposed to other individuals who smoke (e.g., family members, friends, movie characters). However, there has been little research conducted to identify influential environmental factors on smoking. As a result, smoking cessation programs have not been able to effectively counter the influence of the environment in a treatment context.

The history of smoking cessation techniques does show an increased awareness of the potential influence of the individual's environment on his/her cigarette smoking. Cessation techniques have progressed from the use of unitary techniques conducted in a laboratory (e.g., aversion conditioning), to techniques which assumed some environmental impact on smoking (e.g., stimulus control), to multidimensional techniques which recognize the complexity of smoking and try to attack the problem through the use of multiple approaches. This progression represents a gradual
shift in focus away from control of smoking in an artificial environment (e.g., laboratory) to at least partial control of smoking by the individual in his/her own environment. Nevertheless, cessation techniques have not typically evolved from theory or research concerning smoking behaviour. For example, although intervention programs often include a stimulus control component, research has not been conducted to determine (a) whether environmental stimuli do, in fact, influence smoking, and (b) which environmental stimuli influence smoking. Therefore, the effectiveness of stimulus control procedures is necessarily limited.

A worthwhile pursuit, at this time, is the determination of specific environmental factors which affect cigarette smoking. A solid understanding of those factors which influence smoking will ultimately facilitate development of appropriate prevention and intervention strategies.

A further issue arising from the limited success rates of current intervention programs is the relevance of complete abstinence for all clients who seek treatment. Frederiksen (1979) has suggested that a more relevant goal for some smokers may be controlled smoking at a reduced level of intake. However, the incorporation of effective
control procedures into intervention programs requires an understanding of those influential variables which affect the individual's smoking behaviour during and after treatment. In addition, controlled intake at a reduced risk level requires an appreciation of the parameters of smoking topography. Although most research to date has employed gross measures of smoking behaviour (i.e., number of cigarettes per day), there is growing recognition that topographical components of smoking are also important variables for modification. Health risks for smoking related disease increase with greater doses of harmful constituents of tobacco smoke such as carbon monoxide, tar, and nicotine (USPHS, 1971, 1975; Van Lancker, 1977). Dose is determined by the interaction of three main factors: (a) substance (e.g., brand), (b) number of cigarettes smoked per day, and (c) smoking topography (e.g., number of puffs, depth of inhalation) (Frederiksen, 1979; Frederiksen, Martin & Webster, 1979). As Frederiksen (1979) argues, reduction in daily smoking rate may be of little importance from a health standpoint if the individual switches to a more potent brand or takes more frequent, deeper puffs. To date, there have been few studies attempting to observe various aspects of an individual's smoking topography and to determine the interrelationships among those variables.
Relevant procedures to assist clients to control their smoking at a reduced risk level cannot be developed until behavioural data are collected concerning topographical variables of smoking and the factors which influence those variables.

Summary

Smoking cessation research has given rise to at least two issues which point to the need to conduct behavioural investigations of smoking. First, the continued limited effectiveness of programs suggests an inadequate appreciation of those factors which influence smoking behaviour. Environmental variables represent one source of influence that is not well understood. Secondly, poor treatment results at follow-up suggest that complete abstinence may be an unattainable goal for some clients. Certainly, controlled intake at a reduced risk level is worth considering as an alternative to complete abstinence. However, efficient control procedures can only be developed with a firm understanding of the interrelationships among topographical components of smoking and a solid grasp of those factors which affect smoking topography.

Theories Concerning Environmental Influences on Smoking

The hypothesis that specific environmental variables (e.g., ashtrays, someone else smoking) influence smoking
behaviour derives from two main areas of theory. First, theories of smoking behaviour which are based on the role of cues or environmental supports for smoking are directly relevant to this issue. Secondly, social learning theory, which addresses the effects of observing another individual's behaviour, can also be applied to smoking behaviour.

The role of environmental cues in the maintenance of smoking behaviour is explained best by the Mausner and Platt (1971) ecological model and a habit conceptualization of smoking behaviour (Hunt & Matarazzo, 1970; Logan, 1970). According to the ecological model, smoking is a complex behaviour supported by the smoker's environment, psychological state, and physiological state. The term "ecological" signifies an interactive relationship between the individual and his/her environment. The general character of the environment is viewed as conducive to smoking because there are observable stimuli to smoke such as ashtrays and vending machines located in the smoker's milieu. These stimuli belong to the smoker's physical environment and are assumed to support smoking behaviour. Stimuli in the smoker's social environment can also stimulate the use of cigarettes. Mausner and Platt (1971) suggest that social groups support smoking by (a) sharing
cigarettes, and (b) providing stimuli to smoke (e.g., sight and smell of cigarettes, sight of another person smoking).

The ecological model states very generally that the immediate environment of the smoker influences smoking behaviour. Mausmer and Platt (1971) refer to characteristics of both the physical environment (e.g., ashtrays) and social environment (e.g., someone else smoking). However, the dynamics of the relationship between these environmental variables and smoking behaviour are not explained. That is, the environment is viewed as a support for smoking, rather than as a direct influence which affects the occurrence or rate of cigarette smoking. The ecological model has not been systematically investigated as yet, most likely because the model speaks only in general terms and does not predict variations in behaviour as a function of environmental variables. Nevertheless, the basic premise of the model suggests that smoking should vary according to the presence or absence of physical and social supports for smoking.

A habit conceptualization of smoking helps to explain why particular cues in the smoker's environment may influence smoking behaviour. Hunt and Matarazzo (1970) explain that as a behaviour pattern develops into a habit, the smoking response becomes associated with a large number
of stimuli independent of the original primary reinforcer. Affect or primary reinforcers may be important in the acquisition of smoking; however, a habit conceptualization challenges their continued effectiveness in maintaining repetitive behaviour. The tendency to smoke in particular situations, such as when drinking coffee or when with other people, depends on the frequency with which smoking has occurred in those contexts during the past (Hochbaum, 1965; Hunt & Matarazzo, 1970; Logan, 1970). The general context of a situation is assumed to affect both the occurrence and rate of smoking behaviour (Logan, 1970). However, a habit conceptualization fails to elucidate those specific environmental contexts or events which influence smoking.

Both the ecological model and a habit conceptualization of smoking posit that smoking is associated with the general context of the environment. Nevertheless, neither theory adequately delineates the influential variables nor the processes involved in the association. Moreover, it is unlikely that smoking behaviour can be explained solely on the basis of past experience, as a habit conceptualization suggests. For example, a smoker may have had a great deal of experience smoking when drinking coffee. However, smoking may be inhibited on those occasions when additional features of the environment are present as well (e.g.,
presence of a non-smoker, no-smoking signs, lack of ashtrays). Therefore, the potential of a particular situation to influence behaviour is likely affected by various features of both the physical and social environment, rather than by the general context of the situation alone (e.g., when drinking coffee).

Although there is a lack of adequate theory in the smoking literature per se to explain the role of environmental factors in smoking behaviour, social learning theory can provide some insight. According to Bandura (1971, 1977), one of the effects of observing another individual's behaviour is response facilitation. Actions of other individuals may serve as social cues for eliciting behaviour by the observer which is socially acceptable. In response facilitation, the observed action (e.g., offer of cigarettes, someone else smoking) functions simply as a social prompt to elicit a behaviour which already is learned and a part of the person's repertoire.

Bandura (1977) and Walters (1968) suggest that responsiveness to modeling cues may be related to characteristics of the model, characteristics of the observer, and response consequences associated with the behaviour. Bandura (1977) believes, however, that the effects of modeling overshadow characteristics of the model,
characteristics of the observer, or the relationship between the model and observer. Such characteristics are assumed to play a particularly minor role when the modeled behaviour is functional, or presumably, socially acceptable (Bandura, 1977).

Although characteristics of the model and observer (e.g., gender) have not been investigated as yet with respect to response facilitation, studies focusing on the acquisition of new behaviour or disinhibition of feared behaviour support the view that gender of the model is not a significant factor (Raskin & Israel, 1981; Somervill, Mullenberg, Benz & Chaisson, 1981). However, perceived similarity may enhance the effects of modeling (Rosenthal & Bandura, 1978). Presumably, the greater similarity which a subject perceives in the model, the greater the effect of modeling. Nevertheless, Somervill et al. (1981) were unable to demonstrate that increased similarity between subject and model (i.e., same gender, similar status) increased the effect of modeling. The bulk of research concerning modeling has not been directed towards the issue of response facilitation; therefore, factors which mediate this type of effect of modeling are not yet known. Theory would suggest that heightened similarity between the observer and model may lead to increased response facilitation.
Social facilitation theory extends the notion of modeling to posit that the sight or sound of others engaged in the same activity may not only release but also augment that activity in others (Allport, 1972; Wheeler, 1968; Zajonc, 1971). The concept of augmentation is a major difference between response facilitation, as described by Bandura (1971, 1977), and social facilitation. Observation of another person performing a behaviour may produce similar behaviour in the observer due to (a) reduction of restraint to perform that behaviour, (b) perception of the reactions of others to the situation, and (c) susceptibility to influence of the group (Allport, 1972; Blake, 1958; Wheeler, 1968).

Stimuli in the smoker's social and physical environment can thus prompt the release of smoking behaviour in two ways. First, the smoker may have had previous experience smoking in such contexts during the past. Secondly, the smoker who observes someone else smoking is encouraged to engage in similar behaviour because that behaviour is already learned and socially acceptable. Social facilitation theory and social learning theory present a more active viewpoint of the role of the social environment in smoking than the mere temporal associations theorized by the habit and ecological models.
A related theory that focuses on the contribution of nonpharmacological factors to drug behaviour is the Pavlovian conditioning model. Although the model has been applied thus far to the development of tolerance and dependence in the use of opiates and ethanol, the basic premise that environmental cues can influence drug administration is certainly relevant to an understanding of cigarette smoking.

In brief, the theory draws on processes of Pavlovian conditioning whereby various drug administration rituals or environmental cues (conditional stimulus) are paired regularly with the actual pharmacological product (unconditional stimulus). An association between these environmental cues and drug administration develops with the result that the environmental cues eventually elicit drug-compensatory conditional responses. In the case of opiates and ethanol, it appears that the conditional responses are opposite to the effects of the drug, and may be interpreted by the consumer as "craving" (Hinson & Seigel, 1980, 1982; Poulos, Hinson & Seigel, 1981).

As yet, the contribution of such Pavlovian conditioning processes to nicotine tolerance, dependence, or situational behaviour is not clear. Nevertheless, the basic premise of the theory is that environmental stimuli that have
regularly accompanied the administration of a drug, can eventually come to exert a direct influence on drug behaviour. As such, the Pavlovian conditioning model supports the predictions of a habit conceptualization and the social learning explanation of environmental influences on smoking. On the basis of these theories, the presence of a person who is smoking should affect both the occurrence and rate of smoking by an observer, given that the observer is a smoker.

Research Concerning Environmental Influences and Smoking Social environmental variables. To date, there has been little research investigating specific environmental influences on smoking. Despite the lack of systematic research, self-report data do lend support for the view that the general social environment of the smoker is highly conducive to smoking (e.g., friends and family members who smoke: Health & Welfare Canada, 1977; Kozlowski, 1979; Mettlin, 1973).

To further support this viewpoint, a recent retrospective study of 109 married couples found that 37 couples had been concordant with respect to smoking (i.e., both partners smoked) when they had started to date. Several years later (2 - 44 years), the majority of those couples still were concordant smokers. Those couples who
were initially concordant tended to be more stable with respect to smoking than initially discordant pairs. The researchers concluded that spouses can reinforce the behaviour of each other and buffer or resist pressures to change their smoking status. Resistance to change appeared enhanced by having a close relation who behaved in the same way (Price, Chen, Cavalli-Sforza & Feldman, 1981). Therefore, the social environment of the smoker does appear to support, in some way, the continuance of smoking behaviour.

Moreover, retrospective self-report studies have shown that smokers often report interpersonal situations such as "when talking" or "when in company" as coinciding with their smoking (Foss, 1973; Health & Welfare Canada, 1977; McKennell, 1970; Mettlin, 1973). In addition, ex-smokers have reported that relapses to smoking have occurred during situations which were reminiscent of, and conducive to, smoking (e.g., attending a party, being with friends who smoke, living with a partner who smokes)(Ferster, 1970; Kanzler, Jaffe & Zeidenberg, 1976; Perri, Richards & Schultheis, 1977; Schwartz, 1977).

Although social situations have been suggested as potential contributors to relapse, few studies have actually identified those antecedent conditions associated with an
individual's return to smoking. Recently, Shiffman (1982) investigated situations which occurred prior to the experience of a relapse crisis (i.e., strong desire to smoke) or a relapse occurrence (i.e., subject did smoke). Subjects were 183 ex-smokers who telephoned a crisis hotline to seek help in staying abstinent. In 80% of the cases, the relapse crisis or occurrence had taken place within two days of calling the hotline. Therefore, the researchers were able to obtain recent self-report data from subjects rather than longer term retrospective data.

One-third of the callers reported being exposed to smoking specific stimuli, such as the sight of another person smoking, at the time of the crisis or relapse occurrence. In addition, 20% of callers had been drinking alcohol in the company of others at the time of a strong desire to smoke. These data are consistent with earlier reports which suggested that relapse is associated with the presence of other smokers or being in a social situation (Ferster, 1970; Kanzler et al, 1976; Perri et al, 1977; Schwartz, 1977).

In those cases where an ex-smoker was exposed to another person smoking, 54% of the ex-smokers relapsed and smoked a cigarette. Shiffman (1982) concluded that the risk of relapse appears to be heightened by certain antecedent
conditions such as drinking alcohol or exposure to other smokers. The majority of crises and relapses occurred while the individual was in the company of other people. However, the author cautioned that antecedent conditions for a single occasion of crisis or relapse do not represent all of the factors to which the subject is exposed. Furthermore, the subject's ability to employ coping responses is an important mediator of the effects of situational conditions. Nevertheless, the data do support the view that aspects of an individual's social environment (e.g., presence of other smokers) can influence smoking behaviour. The major shortcomings of research to date have been the reliance on retrospective self-reports to establish an association between environmental influences and smoking behaviour, and the failure to explain the processes by which such environmental influences affect smoking.

A handful of investigations have attempted, thus far, to establish an association between situational events and smoking by means of a self-monitoring technique rather than retrospective verbal reports. Epstein and Collins (1977) conducted an investigation where 14 subjects maintained a record of the occasions when they smoked. For the majority of subjects, a relationship was found between some stimulus event (e.g., talking to a friend) and smoking; however, no
common event emerged across subjects. In a further study investigating temporal control of smoking among four subjects, Collins and Epstein (1978) found that smoking was not significantly related to time of day. Although the foregoing studies marked the first published attempts to document an association between situations and smoking, the data still relied solely on the ability of the smoker to provide accurate information regarding his/her smoking. Moreover, temporal associations between environmental variables and smoking do not demonstrate that environmental variables actually affect either the occurrence or rate of smoking behaviour. It is the latter type of demonstration that is required in order to support the view that environmental variables are important in the continuance of smoking behaviour.

Recently, a team of investigators in the United States broke away from the traditional reliance on self-report data to establish a residential laboratory where subjects' smoking behaviour can be observed (Ray, Emmurian, Brady & Nellig, 1982). Subjects reside in the laboratory for a period of 2 - 12 days duration and participate in a schedule of activities which change hourly. Continuous observation of subjects is afforded by close circuit television. The types of hourly activities can be
divided into work (e.g., computer tasks, lever pressing) and nonwork (e.g., meals, reading).

Initial results demonstrated a significant relationship between coffee drinking and smoking for the eight subjects. Smoking was twice as likely to occur within the 20 minute period after coffee drinking compared to the 20 minute period before coffee drinking. Also, the distribution of smoking varied according to whether an activity was work or non-work. During the non-work periods, smoking was initiated earlier and was evenly distributed throughout the hour. In contrast, smoking during the work periods began later and tended to occur mainly during the latter part of the hour. There was no evidence to indicate that smoking was related to time of day. The researchers concluded that smoking is likely influenced by a combination of situational factors and hence should be investigated by means of multivariate techniques using direct observation of smokers (Nellis, Emurian, Brady & Ray, 1982).

A second report from the same laboratory addressed the topic of variability in the time intervals taken between cigarettes (Ray et al., 1982). The time intervals between cigarettes were fairly stable within subject when odd days were compared to even days, although the shape of the distributions varied markedly from a normal distribution.
The general pattern consisted of many intervals of similar durations interspersed with occasional long intervals. The six volunteers who were observed showed no evidence of time of day peaks. However, the authors pointed out that there were no restrictions on smoking at anytime during the stay at the residential laboratory. Therefore, results obtained with respect to the relatively stable cigarette intervals and absence of temporal control may not be generalizable to smoking behaviour in the natural environment where the smoker is exposed to a variety of situations which may support or restrict smoking to varying degrees. The latter two reports represent systematic attempts to observe smoking behaviour in relation to such variables as time of day, type of activity, and coffee drinking. Each variable was treated separately, and the authors advised that future research should attempt to study the impact of a number of situational variables simultaneously.

The strongest evidence that situational variables can influence consummatory behaviour has been provided by a handful of studies investigating modeling. The topic of environmental influences on consummatory behaviour is relatively new and, consequently, not well-researched across the alcoholism, obesity, and smoking fields. The first published investigations concerning modeling appeared in the
alcohol literature (Caudill & Marlatt, 1975). Only recently has the topic of modeling emerged as a concern for investigators of eating behaviour (Conger, Conger, Wright & Matter, 1980) and cigarette smoking (Bolla, 1979, Antonuccio & Lichtenstein, 1980).

A common format of modeling studies is to observe the consummatory behaviour of a subject exposed to a model who consumes a specified amount of a particular substance (e.g., wine, crackers). During some of the experimental conditions, the model may consume a large amount of the product. During other conditions, the model may consume a small amount of the substance or the subject may be left alone. In general, subjects drink or eat larger amounts of the substance when exposed to a model who also consumes a large amount than when exposed to a model who consumes less or when left alone (Caudill & Lipscomb, 1980; Caudill & Marlatt, 1975; Conger et al., 1980; Nisbett & Storms, 1974).

The issue of modeling and cigarette smoking has received little attention to date. Antonuccio and Lichtenstein (1980) investigated the impact of light and heavy smoking models on the smoking topography of 24 male undergraduates. Subjects smoked significantly more cigarettes, puffed faster, and took longer drags when in the presence of a heavy smoker (3 cigarettes/45 minutes)
than when in the presence of a light smoker (2 cigarettes/45 minutes). Limitations of this study were that (a) the study was conducted in a laboratory rather than a natural setting, (b) subjects knew that their smoking behaviour was being observed, (c) subjects were instructed to smoke at least two cigarettes, and (d) the model interacted verbally with the subject throughout the observation period. Consequently, the study does not address the question of true variability of smoking in the natural environment because subjects were required to smoke in a contrived setting. Furthermore, the impact of modeling may not hold beyond social interaction situations.

An investigation by Ossip; Epstein and McKnight (1980) assessed the relative effects of coffee drinking and modeling (i.e., nonsmoker/smoker) on the smoking behaviour of 30 male undergraduates. Results failed to support an effect for either coffee drinking or modeling. In this case, there was no social interaction between the model and the subject. This investigation thus questioned the power of modeling to influence smoking behaviour when there is no on-going verbal interaction between the model and observer.

The two foregoing investigations employed male university students in a design where each subject was observed individually with a model. However, Bolla
(1979) conducted a study to determine the effects of encouragement to smoke (model smoked and offered cigarettes) and no encouragement (model refrained from smoking and offering cigarettes) on the behaviour of small groups of working women. Results showed that subjects smoked significantly more cigarettes when the model encouraged them to smoke (i.e., model smoked and offered cigarettes every 15 - 20 minutes) than when she presented no encouragement to smoke. However, the group situation was a discussion task, which again restricted generalizability of results to social interaction situations. Furthermore, the study could not control the behaviour of individuals other than the designated model and, therefore, was not a true test of modeling per se. Nevertheless, the study did demonstrate that explicit cues in the setting, such as another person's behaviour, can influence smoking rate when subjects are not required to smoke and are unaware that their smoking behaviour is of relevance to the investigation.

The major shortcoming of research to date on modeling has been the tendency to view and investigate modeling as an isolated variable. This view is an oversimplification that ignores the likely interactions that operate among a number of factors related to (a) the observer (e.g., gender,
motivation, history of substance use), (b) immediate physical environment (e.g., availability of substance, ashtrays, prohibitive/permitting signs), (c) characteristics of the model (e.g., gender, status), and (d) context of the situation (e.g., social interaction). Furthermore, studies to date have only investigated situations where the model's behaviour is consonant with the physical surroundings (e.g., model smokes when ashtrays are present). However, environmental cues can occur in various combinations and are not always consonant. For example, another person may smoke in the presence of a no smoking sign or when there are no ashtrays available. It is important at this time to explore the relative importance of various types of cues (e.g., social and physical environmental) and their combinations.

**Physical environmental variables.** The systematic investigation of environmental influences on smoking represents a relatively new topic for research. As a result, there has not been adequate opportunity to investigate diverse types of environmental variables or their interactions. To date, most attention has been paid to social influences on smoking to the relative exclusion of physical environmental influences (e.g., ashtrays, signs, vending machines).
Physical variables present in one's environment should conceivably support the continuance of smoking behaviour because such variables occur in the environment at a high frequency, and implicitly endorse smoking. Moreover, ashtrays represent a stimulus which has frequently been associated with smoking behaviour during the individual's history as a smoker. Therefore, the presence of ashtrays should affect the occurrence and rate of smoking if a habit conceptualization and ecological model of cigarette smoking hold true.

It is interesting to note that applied environmental psychologists are becoming increasingly concerned about modifying the behaviour of large sectors of the population by altering physical environmental conditions surrounding those behaviours. For example, attempts to modify the public's littering behaviour have included the use of varied types of signs and trash cans (Finnie, 1973; Geller, 1980; Geller, Witmer & Tuso, 1977). Indeed, one popular method to alter the smoking behaviour of the general public has been to employ no smoking signs. However, the effectiveness of this method has not been established. It may be the case that ashtrays continue to be present and people continue to smoke in at least some locations where no smoking signs have been posted. Therefore, it is important at a public level
to determine which physical environmental stimuli or combinations of stimuli influence people's cigarette smoking. In this way, the most efficient methods for deterring cigarette smoking can be developed.

The issue of physical environmental influences on smoking also has relevance from an intervention standpoint. If physical environmental variables do, in fact, affect the occurrence and rate of a client's cigarette smoking, then this information must be directly addressed in smoking cessation programs in order to maximize long-term success rates.

Summary

According to a habit conceptualization of smoking and an ecological model of smoking, the social and physical environment of the smoker support the continuance of the behaviour. Specifically, characteristics of the social environment (e.g., presence of another smoker) and the physical environment (e.g., ashtrays) are assumed to influence the occurrence and rate of smoking behaviour. Social learning theory and social facilitation theory provide a further theoretical rationale for the view that one's social environment can influence behaviour which has been learned previously and is socially acceptable.

Early published investigations concerning environmental
variables and smoking relied on retrospective self-reports or self-monitoring data provided by subjects. A recent improvement in the quality of research on this topic has been the introduction of observational techniques to monitor the subject's actual smoking behaviour. Although there have been few observational studies to date, preliminary results support the view that the presence of another individual (e.g., heavy smoker, light smoker, nonsmoker) influences the rate of smoking on the part of the observer.

It is not yet known, however, whether the modeling effect is generalizable to natural settings where the subject is unaware that his/her smoking is being observed or to situations which do not involve ongoing verbal interaction between the model and observer. Moreover, modeling typically has been investigated as an isolated factor. That is to say, published investigations have not explored the effects of modeling in combination with other types of factors (e.g., physical environmental, gender).

The basic question of physical environmental influences on smoking behaviour has received little attention to date. Therefore, it is an important endeavour at this time to explore not only the role of social environmental influences such as modeling but also the role of physical environmental influences (e.g., ashtrays) and their interaction.
GENDER AND ENVIRONMENTAL INFLUENCES ON SMOKING

As mentioned above, modeling has yet to be investigated in a factorial manner which would permit demonstration of whether modeling interacts with other types of factors. A factorial design which includes variables representing characteristics of the social environment (e.g., modeling), the physical environment (e.g., ashtrays) and the individual (e.g., gender) more closely approximates the true state of a natural setting than univariate designs which focus on one factor alone.

Although the topic of gender differences in observed smoking behaviour has received virtually no attention to date, the topic certainly is an important one. Recent trends in the level of cigarette use among women point to a critical need to understand smoking behaviour among this subgroup of the population. For example, a decrease in all levels of cigarette smoking (i.e., light, moderate, heavy) has occurred among males, whereas an increase in the percentage of moderate and heavy smokers has occurred among women (Health & Welfare Canada, 1976, 1977, 1979; USDHEW, 1980). Furthermore, the lowest rate of smoking for men occurs among individuals with a high level of education (i.e., at least some university) who are employed in white
collar positions. However, the reverse appears to be the case for women whose consumption of cigarettes increases with higher educational and occupational attainment (Health & Welfare Canada, 1977; Kozlowski, 1979; Sterling & Weinkam, 1976, USDHEW, 1980). Finally, it appears that women may encounter greater difficulty stopping smoking and may display lower long-term success rates than their male counterparts in treatment (Gritz, 1978; Kozlowski, 1979; Mushinski & Stellman, 1978; Sterling & Weinkam, 1976; USDHEW, 1980).

The foregoing trends in the use of cigarettes by women underscore the need to include women in subject samples for research. However, behavioural research to date has focused on male smokers alone. As increasing numbers of women are pursuing higher education and full-time employment in the labour force, health professionals must become increasingly sensitive to health hazards relevant to these individuals and must make efforts to include working women, in particular, in research samples.

The advantage of including both men and women in an investigation of cigarette smoking is that such a design permits detection of those similarities or differences which have significant implications for prevention and treatment programs. For example, a difference in the way that men and
women respond to environmental factors may imply slightly different treatment approaches which will eventually aid the tailoring of treatment to the client. An important research step, at present, is the collection of preliminary observational data on the smoking topography of men and women exposed to similar environmental circumstances.

Summary

The study of social and physical environmental influences on cigarette smoking holds promise at this time for the improvement of smoking cessation programs. In addition, such endeavours may assist the advancement of theory and the development of prevention strategies which, in combination with other important measures, will eventually deter the onset and maintenance of smoking. Currently, there is an inadequate understanding of factors affecting smoking behaviour and whether environmental factors influence men and women in a similar way.

Another aspect of the smoking phenomenon which is not well understood is smoking topography (i.e., the way people smoke). Although topographical components influence health hazards associated with smoking, few investigations have observed components of smoking behaviour or assessed sex differences related to various components.

The purpose of the present investigation was to study
the effects of one social environmental support for smoking (i.e., modeling) and one physical environmental support for smoking (i.e., ashtrays) on the smoking behaviour of adult men and women. The study was conducted on site at the subject's place of work in order to test the effects of environmental supports for smoking in a more natural setting than has been employed in the past. A between-subjects factorial design (Model X Ashtray X Gender) was employed in order to test main effects and interactions of the three factors.

Hypotheses

The following research questions and hypotheses were outlined in advance for the investigation. No specific predictions were stipulated in advance concerning interrelationships among the smoking topography measures, or concerning the gender factor. As an alternative to specific hypotheses, general research questions were postulated to address these issues.

Measures of Smoking Behaviour

Postulate 1: A review of the literature on smoking behaviour uncovered the need to explore various measures of smoking topography. Relevant issues for the present investigation were the determination of the best measure(s).
for an unobtrusive, observational study, and the determination of whether topographical variables represent distinct entities of smoking behavior.

**Model Factor**

**Hypothesis 1:** More subjects will smoke, and at a higher rate, in the presence of a smoker model than in the presence of a nonsmoker model.

**Gender Factor**

**Postulate 2:** To date, there has been a dearth of behavioral research on gender differences in smoking. The present investigation tested whether male and female smokers respond differently when exposed to similar physical and social environmental variables.

**Ashtray Factor**

**Hypothesis 2:** More subjects will smoke, and at a higher rate, when ashtrays are available than when ashtrays are not available.

**Interactions**

**Postulate 3:** Given the research postulates and hypotheses outlined above, there is also the question of whether the three factors of modeling, gender, and ashtray interact to influence
smoking behaviour.

Although there were no predictions regarding interactions among the independent variables, three hypotheses concerning differences among cell means were outlined prior to data collection.

Hypothesis 3. More subjects will smoke, and at a higher rate, during the pro-smoking condition (i.e., smoker model + ashtray) than during the contra-smoking condition (i.e., nonsmoker model + no ashtray), or the ambiguous conditions (i.e., smoker model + no ashtray; nonsmoker model + ashtray).

Hypothesis 4: During the ambiguous conditions, subjects will be more likely to smoke when the model smokes than when the model refrains from smoking.

Hypothesis 5: Subjects will begin to smoke later during the contra-smoking and ambiguous conditions than during the pro-smoking condition.
CHAPTER 2

Method

Subjects

The sample for this investigation was comprised of 103 adults (72 smokers, 31 non-smokers) employed full-time at two companies in Ottawa, Ontario. A detailed description of the recruitment of businesses to participate in the study is provided in Appendix 1. Appendix 2 explains the process used within the two participating companies to recruit subjects for the investigation.

Company A provided a total of 33 smokers (18 female, 15 male) and 28 non-smokers (10 female, 18 male). Company B provided 39 smokers (22 female, 17 male) and 3 non-smokers (1 female, 2 male). The small number of non-smokers who participated from Company B was a result of the advertisement used at that setting to attract volunteers. The study was advertised as a general investigation of quality of life at Company A. In contrast, Company B preferred to advertise the study as an investigation of the lifestyle of smokers. A more detailed account of the recruitment process at both companies is provided in Appendix 2.
The participation of at least a small number of non-smokers in this investigation was advantageous for at least three reasons. First, the participation of both non-smokers and smokers helped to disguise the main purpose of the study which was to observe the effects of manipulating cues for smoking on the behaviour of smokers. Secondly, it was thought that employee relations would be least disturbed if the study included all types of employees rather than only a select group such as smokers. Finally, the participation of non-smokers afforded the opportunity to collect exploratory data concerning reasons for never smoking, reasons for stopping smoking, and differences between non-smokers and smokers on lifestyle and personality variables. These data, however, were not considered part of the major investigation and, therefore, are not discussed in this report.

Smokers ranged in age from 19 years to 48 years \((\bar{x} = 28.69, \text{s.d.} = 7.94)\). The minimum level of secondary education was grade 10 \((\bar{x} = 12.22, \text{s.d.} = .72)\) while the maximum post-secondary education was five years \((\bar{x} = 1.50, \text{s.d.} = 1.68)\). Ninety-five per cent of the smokers had completed secondary school while 60% of subjects had completed at least one year at a post-secondary institution. Most smokers were either married (40%) or single (46%).
remaining subjects (14%) were separated, divorced or living in common law. Insofar as occupation was concerned, all participants were employed full-time in white collar level positions such as professional positions (e.g., supervisors, computer programmers) or clerical staff. A delineation of demographic characteristics according to gender appears in Table 2. There was one significant difference between men and women on the demographic variables. Male smokers were significantly older than female smokers ($p < .01$).

Generally, both male and female smokers reported smoking a moderate number of cigarettes per day (see Table 3). Subjects were asked on two occasions to report their daily cigarette consumption. The first occasion occurred approximately three weeks prior to the study commencing at each company when interested participants completed the demographic information sheet (see Appendix 3). On the actual day of participation, the subject again was asked to report daily cigarette consumption. The Pearson product moment correlation between these two reports of smoking was $r (72) = .97, p < .001$, indicating that subjects minimally altered their reports of daily smoking rate. Given the high reliability of reports obtained on the first measurement occasion, these daily smoking rates were used in all subsequent analyses as an indicator of subjects' typical
### Table 2

**Demographic Characteristics of Smokers**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>$\bar{x}$</td>
</tr>
<tr>
<td>Age</td>
<td>32</td>
<td>31.66</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>12(38%)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>16(50%)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4(12%)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest Grade</td>
<td>32</td>
<td>12.16</td>
</tr>
<tr>
<td>Post-Secondary</td>
<td>32</td>
<td>1.75</td>
</tr>
</tbody>
</table>
Table 3
Self-Reported Daily Cigarette Consumption

<table>
<thead>
<tr>
<th>Gender</th>
<th>1st Occasion</th>
<th></th>
<th></th>
<th>2nd Occasion</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>x</td>
<td>s.d.</td>
<td>n</td>
<td>x</td>
<td>s.d.</td>
</tr>
<tr>
<td>Male</td>
<td>32</td>
<td>21.53</td>
<td>12.23</td>
<td>32</td>
<td>21.06</td>
<td>12.53</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>21.93</td>
<td>10.18</td>
<td>40</td>
<td>22.40</td>
<td>10.26</td>
</tr>
</tbody>
</table>
cigarette consumption.

Men and women did not differ significantly with respect to the number of cigarettes smoked per day. However, there was a significant difference between men and women according to the number of years that they had been smoking. Men reported that they had been smoking regularly for an average of 15.59 years (s.d. = 7.75), while women reported smoking regularly for an average of 9.35 years (s.d. = 5.14, p < .05). A further analysis indicated that men and women did not differ significantly according to the age when they had started to smoke regularly. Generally, subjects had started smoking at the age of 16 years (s.d. = 3.98). Therefore, the major difference in the smoking history of men and women was that men were older and, therefore, had spent more years smoking than women. Current daily cigarette consumption was similar across gender.

Initial differences between those subjects recruited from Company A and from Company B were tested over 167 variables that measured various aspects of one's lifestyle. Significant differences between smokers at the two companies were detected on the variables of (a) age, (b) years smoking and, (c) number of cigarettes smoked per day. Smokers from Company B were older, had been smoking for a greater number of years, and currently smoked more...
cigarettes per day than smokers employed at Company A. Means and standard deviations for these differences appear in Table 4. Three additional significant differences were detected on the altruism, political behaviour, and job satisfier subscales of the Quality of Life Questionnaire (Evans, Burns & Robinson, 1979). This questionnaire was relevant to the principal investigation only in its function as a filler task which occupied subjects while their smoking behaviour was being observed. Therefore, only those initial differences on the variables of age, years smoking, and daily cigarette consumption were taken into consideration when the major data analyses were conducted.

The assignment of subjects to conditions, the delivery of experimental conditions, and the observation of smoking behaviour did not vary across companies. Therefore, the term "smokers" is used hereafter to refer to the total sample of smokers recruited from both companies.

**Measures**

Dependent variables for the study included the following measures of smoking behaviour: (a) number of cigarettes smoked, (b) puffs per cigarette, (c) time to first-cigarette, (d) time interval between cigarettes, and (c) duration of smoking.

Number of cigarettes referred to those cigarettes lit
<table>
<thead>
<tr>
<th>Item</th>
<th>Company A</th>
<th></th>
<th></th>
<th>Company B</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>( \bar{x} )</td>
<td>s.d.</td>
<td>n</td>
<td>( \bar{x} )</td>
<td>s.d.</td>
</tr>
<tr>
<td>Age</td>
<td>33</td>
<td>25.45</td>
<td>4.79</td>
<td>39</td>
<td>31.44</td>
<td>9.03 **</td>
</tr>
<tr>
<td>Cigarettes/day</td>
<td>33</td>
<td>18.23</td>
<td>9.30</td>
<td>39</td>
<td>24.64</td>
<td>11.69 *</td>
</tr>
<tr>
<td>Years smoking</td>
<td>33</td>
<td>9.97</td>
<td>4.63</td>
<td>39</td>
<td>13.95</td>
<td>8.29 *</td>
</tr>
</tbody>
</table>

* \( p < .05 \)
** \( p < .001 \)
by the subject during the course of a 45 minute observation period. Number of puffs per cigarette referred to the average number of times that the subject placed the cigarette into his/her mouth and then exhaled. A cigarette resting in the subject's mouth was not considered a puff until he/she removed it in order to exhale. Time to the first cigarette referred to the length of time (minutes) which elapsed during the observation period before the subject lit his/her first cigarette. The time interval between cigarettes referred to the average length of time (minutes) between extinguishing one cigarette and lighting another. Finally, duration of smoking referred to the average length of time (minutes) elapsed between lighting a cigarette and extinguishing it.

Because of the nature of this investigation, it was necessary to devise a task which would occupy subjects for approximately 45 minutes to allow sufficient time for the modeling of smoking or nonsmoking behavior and for observation of the subject's behavior. Moreover, the task needed to be one which would allow subjects the freedom to smoke but also keep them occupied so that there would be no social interaction with the model. Finally, the task needed to be relevant to the topic of smoking because subjects had to be informed in advance, for ethical reasons, that part of
the study concerned smoking. However, the true nature of
the investigation could not be divulged to subjects because
such information could alter their smoking behaviour during
the experiment.

As a means of satisfying the above requirements, a
group of questionnaires was compiled which was relevant to
the topic of smoking and, at the same time, provided
descriptive information concerning lifestyle and
consummatory habits. The questionnaires themselves were not
primary targets of investigation for the purposes of this
report. Therefore, only a brief description of each is
provided.

The questionnaires were divided into two parts. Part 1
(see Appendix 4) was completed by subjects during the 45
minute observation period and did not involve any verbal
interaction with the model who was present the entire time.
Part 2 (see Appendix 5) was a short interview conducted
immediately after completion of the pencil and paper
questionnaires. The interview was included in order to
provide a rationale for seeing subjects individually and to
permit the subject to elaborate on various aspects of
his/her consummatory habits.
Part 1 Questionnaires

The paper and pencil questionnaires (see Appendix 4) which were completed by the subject during the 45 minute observation period were as follows:

**Quality of life questionnaire.** The Quality of Life Questionnaire (Evans et al., 1979) consists of 192 statements which require a true or false response. The questionnaire includes 15 subscales which assess the quality of five major domains of a person's life: (a) general well-being, (b) interpersonal relations, (c) organizational behaviour, (d) occupational behaviour, and (e) leisure/recreational activity.

**Basic personality inventory.** The Basic Personality Inventory (Jackson, 1976) consists of 240 items which represent 12 scales. For the purposes of this investigation, the three scales of depression, alienation, and anxiety were used. There were 20 items in each scale, which created a total of 60 statements to which the subject responded TRUE or FALSE.

**Physical activity inventory.** This questionnaire was not a published scale. It was designed to provide basic information regarding the subject's exercise routine and opinions regarding the merits and disadvantages of exercise. Ideas for the items included in this scale were generated
by five nonsmokers and five smokers who were not subjects in this investigation. The length of the scale was adjusted according to pre-tests of the questionnaire package, which had been administered to five volunteers to determine the approximate length of time required to complete all questionnaires. The main purpose of this scale, then, was to act as a filler which increased the length of the questionnaire package to approximately 45 minutes.

**Occupation inventory.** The Occupation Inventory was drawn from Pearlin's (1972) "Problems of Everyday Life" interview schedule. Items were extracted from the occupation section of the interview schedule and presented in a pencil and paper format. The occupational section of Pearlin's (1972) scale assesses (a) inadequacy of rewards, (b) noxiousness of work environment, (c) depersonalization in the work environment, and (d) role overload.

**Part 2 Questionnaires**

The questionnaires (see Appendix 5), which were administered verbally by the researchers, were completed by subjects as follows. All subjects were asked the items contained in the Consumption Pattern Inventory and the Alcohol and Food Use Inventory. Otherwise, the research assistant administered the appropriate remaining scale(s) according to the subject's current smoking status (i.e.,
smoker, ex-smoker, never smoker).

1. Consumption Pattern Inventory
2. Reasons for Smoking Scale (Horn, 1976) – smokers
3. Expectations of Cessation – smokers
4. Reasons for Not Smoking – never smokers
5. Reasons for Quitting Smoking – ex-smokers
6. Alcohol and Food Use Inventory.

Consumption pattern inventory. This inventory provided a reliability check on the number of cigarettes smoked per day by each subject in addition to other relevant information concerning smoking (e.g., age when started smoking, perceived level of smoking, type of tobacco products used). The inventory also elicited general information regarding alcohol consumption (type of preferred alcohol, frequency of excessive drinking) and eating habits.

Reasons for smoking scale. Horn's (1976) questionnaire measures six broad reasons for smoking by means of 18 statements. The general categories for smoking which are measured include (a) stimulation, (b) handling, (c) pleasurable relaxation, (d) tension reduction, (e) psychological addiction, and (f) habit.

Each item of the scale was read in its proper order while the subject looked at a card on which various ranks were displayed. The subject was required to choose a
number for each statement according to how often he/she felt that way when smoking cigarettes. The possible choices were 1 (never), 2 (seldom), 3 (occasionally), 4 (frequently) and 5 (always).

There generally has been a paucity of research investigating the reliability and validity of smoking motivation typologies. However, Horn's (1976) structure recently was replicated with a sample of 2,000 adult men (Costa, McCrae & Bosse, 1980). The 1976 scale is a shortened version of the original 23 item questionnaire developed by Ikard, Green & Horn (1969), which uncovered the six factors in a national probability sample of smokers. Furthermore, subsequent attempts to expand the six factor model (Best & Hakatian, 1978; Coan, 1973) have replicated the original model and failed to uncover significant new dimensions. As Costa et al. (1980) conclude, validity studies support the notion that the variables measured in the shortened version "seem to be important, stable, and general dimensions" defining the role of smoking in the individual's life. Of course, the scale can only provide information regarding the subject's perceptions of his/her smoking; it is not known whether such perceptions accurately reflect behaviour.

Horn's (1976) scale does not allow for subjects to
provide any information on their smoking beyond choosing the appropriate number for each statement. In the present investigation, the research assistant asked subjects to provide additional reasons for smoking that were not covered by the questionnaire. In addition, subjects were encouraged to elaborate on any of the responses which they had provided.

**Expectations of cessation.** Currently, there are no published or standardized scales measuring a smoker's expectations regarding cessation of smoking. Nonetheless, information concerning such expectations may cast light on the tenacity of the smoking habit, particularly among women. The present study provided a good opportunity to gather preliminary data regarding expectations of cessation from a group of smokers who were not enrolled in a smoking intervention program. The 14 items that were ultimately included in the scale were generated by a handful of smokers in the community and by the author on the basis of her experience conducting smoking intervention programs. The subject chose a number on a card after each statement read by the research assistant. The numbers ranged from 1 (strongly disagree) to 5 (strongly agree). The subject also was permitted to offer any explanatory comments for the choice of a particular number. At the end of the
questionnaire, the subject was asked to suggest any other expectations regarding stopping smoking which had not been mentioned.

**Reasons for not smoking.** The purpose of this questionnaire was to elicit information regarding reasons why non-smokers had never smoked on a regular basis. There are no published scales measuring non-smokers' perceptions or opinions concerning influential people, events, or information which may have deterred them from smoking. Items for this scale were generated by five non-smokers who were not part of the study. After each of the 14 statements, the subject responded TRUE or FALSE. If the statement was false, the research assistant simply read the next statement. If the statement was true, the subject was then asked to rank the influence of that particular reason for not smoking on a scale from 1 (not at all influential) to 3 (very influential). For example, a subject may have responded affirmatively to the statement "At least one of my parents told me not to smoke"; however, he/she may believe that this advice was not particularly influential in staying away from cigarettes. At the end of the questionnaire, the subject was asked to generate other reasons why he/she never became a regular smoker.

**Reasons for quitting smoking.** Once again, there are no
published scales available to determine ex-smokers' motivation for having stopped smoking. A questionnaire was developed for the purposes of this investigation on the basis of reasons for stopping smoking which were generated by 10 smokers enrolled in a smoking cessation program. The general reasons covered by the questionnaire were (a) the influence of other people, (b) health concerns, and (c) financial reasons. Subjects were also given the opportunity to suggest additional reasons for stopping smoking upon completion of the scale items.

Alcohol and food use inventory. This 10 item scale described five reasons for the use of food and five reasons for the use of alcohol. Items were included to parallel the type of reasons covered by Horn's (1976) Reasons for Smoking Scale (e.g., tension reduction, stimulation). Each item was ranked by the subject on a scale from 1 (strongly disagree) to 5 (strongly agree). In addition, subjects were asked to generate occasions when they tend to eat and drink to excess.

Conditions

A complete between subjects factorial design with three factors (i.e., 2 x 2 x 2) was employed. Each subject participated in one condition which was a combination of the following factors:
1. Gender (male/female)
2. Ashtray (presence/absence)
3. Model (nonsmoker/smoker)

Generally, the design can be conceptualized as an investigation of three major types of influence on smoking: (a) Characteristics of the Individual (i.e., gender), (b) Characteristics of the Physical Environment (i.e., presence or absence of ashtrays), and (c) Characteristics of the Social Environment (i.e., presence of a smoker or nonsmoker). The design (see Figure 1) permitted the investigation of the impact of various combinations of the foregoing factors on the smoking behaviour of adult subjects.

The two manipulated variables in this experiment were the Ashtray and Model factors. The Ashtray factor varied as follows. During the No Ashtray condition, there were no ashtrays located in the testing room. During the Ashtray condition, an ashtray was located on the table where the subject completed the questionnaires. During the Nonsmoker Model condition, a research assistant who was the same sex as the subject refrained from smoking while the subject completed a series of questionnaires. During the Smoker Model condition, the research assistant smoked three cigarettes while the subject completed the questionnaires.
<table>
<thead>
<tr>
<th></th>
<th>No Ashtray</th>
<th></th>
<th>Ashtray</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>Nonsmoker Model</td>
<td>n= 8</td>
<td>n= 10</td>
<td>n= 8</td>
<td>n= 10</td>
</tr>
<tr>
<td>Smoker Model</td>
<td>n= 8</td>
<td>n= 10</td>
<td>n= 8</td>
<td>n'=10</td>
</tr>
<tr>
<td></td>
<td>n= 16</td>
<td>n= 20</td>
<td>n= 16</td>
<td>n= 20</td>
</tr>
</tbody>
</table>

Figure 1  Factorial design of the conditions

Model x Gender x Ashtray
The first cigarette was lit five minutes after arrival of the subject, followed by two further cigarettes which were lit at 15 minute intervals.

To summarize, each smoker was exposed individually to one of the following experimental conditions:

1. NO ASHTRAY + NONSMOKER MODEL
2. NO ASHTRAY + SMOKER MODEL
3. ASHTRAY + NONSMOKER MODEL
4. ASHTRAY + SMOKER MODEL

The Ashtray and Model factors combined to provide subjects with one contra-smoking condition (i.e., no ashtray + nonsmoker model), two ambiguous conditions (i.e., no ashtray + smoker model; ashtray + nonsmoker model), and one pro-smoking condition (e.g., ashtray + smoker model).

Conditions were randomly ordered such that each successive smoker was exposed to whichever condition was next in order on the list until 10 female smokers and 8 male smokers had been assigned to each of the four experimental conditions. The author knew in advance, the smoking status of each subject on the basis of information provided on the demographic information sheet. However, the research assistant was simply instructed to administer a particular condition to a subject and was not aware of the subject's smoking status or the specific hypotheses associated with
the study. In this way, the model was able to administer treatment and record the smoking activity of subjects without interference from preconceptions regarding the study.

In the case of nonsmokers, only the ashtray factor was manipulated. Although the experimental conditions were irrelevant for the nonsmokers, the ashtray factor was manipulated in order to keep the research assistant naive with respect to the smoking status of the subject. For ethical reasons, it was decided that the model should always refrain from smoking in the presence of a known nonsmoker. To reiterate, only the author knew the smoking status of a particular subject in advance of the testing session. All nonsmokers were designated to conditions which only varied in terms of the Ashtray factor.

Procedure

All experimental sessions took place onsite at each company. In both cases, the companies provided the use of a meeting room which typically was used for special meetings only. Therefore, it was unlikely that subjects would have developed particular smoking habits associated with the setting.

Precautions were followed in order to minimize the amount of smoke in the testing room before each smoker
arrived. These precautions minimized the chance that a subject would begin to smoke in reaction to the smell of cigarette smoke retained from a previous testing session. The first precaution was to schedule subjects 90 minutes apart which meant that there was a period of approximately 30 minutes for the room to air in between appointments. Secondly, testing sessions for nonsmokers were usually scheduled between appointments with smokers to permit adequate time for the room to ventilate. Finally, the research assistants were only permitted to smoke in the testing room when the condition required, which ensured that a build-up of smoke would not occur.

Upon arrival of the subject, a research assistant of the same sex greeted the subject and instructed him/her to sit at a table where a series of questionnaires had been placed. The research assistant then took an adjacent seat at the same table and read the following instructions to the subject.

I am going to begin by giving you some questionnaires on your lifestyle. Then, there will be a short interview. I would like you to think about the questions and try to answer them as accurately as possible. There are a lot of questions, but please do not rush. I am not timing this and would like you to complete the questions carefully rather than quickly. We find that people usually need about 45 minutes to finish all of
the questionnaires comfortably. You will be given extra time if you need it. Please do not put your name on any of the questionnaires. We want to keep your answers confidential and this is made simpler if your name does not appear anywhere. Your completed questionnaires will be given to the supervisor of the study and no one in the company will be allowed access to your answers. Now, here are the questionnaires. Two of them have separate answer sheets inside the question booklets. Instructions are provided on each questionnaire; however, I will be here the whole time in case you have any problems. Please let me know when you have finished all of the questionnaires."

While the subject completed the questionnaires (see Appendix 4), the research assistant appeared absorbed in paperwork. The research assistant was responsible for modeling either nonsmoking or smoking behaviour. In the first case, the research assistant refrained from smoking while in the presence of the subject and kept his/her cigarettes hidden from view. In the second case, the research assistant removed a package of cigarettes from a pocket or purse five minutes after the arrival of the subject and began to smoke a cigarette. Thereafter, the research assistant's cigarettes remained on the table in view of the subject. Two additional cigarettes were lit at 20 minutes and 35 minutes after the arrival of the subject.

The research assistant was also responsible for
recording the smoking activity of the subject according to (a) time when each cigarette was lit, (b) time when each cigarette was extinguished, and (c) number of puffs per cigarette. This basic information was noted by the researcher on a blank piece of paper which was kept away from the subject's view. After the subject had left, the research assistant summarized the smoking data on a tally sheet (see Appendix 6). The observations provided sufficient information to measure the five dependent variables (a) number of cigarettes, (b) time interval between cigarettes, (c) duration of smoking, (d) number of puffs per cigarette, and (e) time of the first cigarette.

The observation period was 45 minutes duration which was the minimum time required to complete all of the questionnaires. After the subject had completed all questionnaires, the research assistant then read a brief introduction to the interview portion of the session.

You have just finished answering some questions about several areas of your lifestyle such as exercise, homelife and worklife. Now we would like to know a little about some other aspects of your lifestyle namely your eating, smoking and drinking habits. I am going to ask you some general questions about each of these topics, then I will read you some statements, which I will ask you to rate according to your beliefs."
The research assistant then conducted a 10 minute interview regarding consummatory habits of the subject (see Appendix 5). During this period, the research assistant simply noted whether the subject lit any further cigarettes.

At the end of the testing session, the research assistant thanked the subject for his/her assistance and reminded the subject that a short summary of results from the study would be made available at a later date (see Appendix 7).

Research Assistants

The design of the study required that one male and one female research assistant be hired to model smoking behaviour and to monitor the subject's behaviour. One 29 year old woman and one 28 year old man were hired on a part-time basis to test subjects approximately two days a week. Both research assistants were regular smokers, had been recently employed full-time in the business community, and had completed at least two years of university education. These two individuals remained with the study until its completion. Each research assistant tested subjects of the same sex and dressed in appropriate business attire when testing subjects. The models were thus similar to their subjects in terms of education, age, gender, and status.
Both research assistants were trained during practice sessions before the study began on site at companies. The author observed five testing sessions per research assistant during the course of the study, which meant that 10 subjects were monitored by a second observer.

At least one example of each experimental condition was observed for both the male and female research assistants. In these cases, the research assistant simply explained to the subject that the author was another member of the research team and was using the room to complete some paperwork. The author was seated in a corner of the room and appeared engrossed in paperwork throughout the testing session. No difficulties arose in terms of the manner in which the assistants modeled or monitored smoking behaviour. Therefore, it was not considered necessary to increase reliability checks as (a) there was a considerable transportation cost involved, and (b) the author did not smoke and therefore could provide a conflicting cue when in the room with a research assistant who was smoking.

Both research assistants reported weekly by telephone to the author concerning their progress. Moreover, the author held bi-weekly meetings with each research assistant in order to further monitor the investigation. Finally, the author was in contact with management at each company every
Week while the data were being collected in order to ensure that the investigation proceeded smoothly.
CHAPTER 3

RESULTS.

Measures of Smoking

Each research assistant recorded the number of puffs taken per cigarette, and the time at which each cigarette was lit and extinguished by the subject. These observations provided data on the following smoking measures, (a) number of cigarettes, (b) time to the first cigarette, (c) number of puffs per cigarette, (d) duration of each cigarette, and (e) time interval between cigarettes.

The author was present as a second observer for 10 smokers (5 males, 5 females). Each experimental condition was observed at least twice in order to monitor the procedure employed by the research assistant and to collect reliability data on the behaviour of subjects. Inter-observer agreement on the smoking variables was high. There was 100% agreement on the number of cigarettes lit, duration of smoking, and the interval between cigarettes (i.e., minutes). The reliability for number of puffs per cigarette was 93% (Agreements - Disagreements/total x 100).

The high reliabilities for these observations were not surprising. First, only four subjects actually smoked;
therefore, the potential for error was limited. Secondly, subjects were unaware that their smoking activity was being observed. The lighting, puffing, and extinguishing of cigarettes occurred naturally and slowly, so that it was a straightforward procedure to record their occurrence. This would not have been the case if finer topographical variables such as puff duration, or volume of inhalation had been included as dependent measures. Finally, the research assistants essentially performed no functions during the experimental session beyond monitoring smoking activity and lighting three cigarettes when the condition required. As a result, he/she was able to devote attention to observation of the subject's smoking behaviour.

Intercorrelations among dependent measures for the entire sample of smokers are displayed in Table 5. Four of the correlations attained statistical significance, however the magnitude of these relationships was moderate. The strongest association existed between the number of cigarettes (NO) and the time of the first cigarette (FC) (n = 33). Early initiation to smoking was associated with relatively high cigarette consumption. Moreover, high cigarette consumption was associated with relatively short intervals of time (INT) between extinguishing one cigarette and lighting another (n = 24). In addition, early onset to
Table 5

Intercorrelations Among Dependent Variables

<table>
<thead>
<tr>
<th>Number of cigarettes</th>
<th>First cigarette (min.)</th>
<th>Puffs. $(\bar{x})$</th>
<th>Duration (min.)</th>
<th>Interval (min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>-.58**</td>
<td>.00</td>
<td>-.13</td>
<td>-.38*</td>
</tr>
<tr>
<td>FC</td>
<td>.20</td>
<td>.39*</td>
<td>-.01</td>
<td></td>
</tr>
<tr>
<td>PUFF</td>
<td>.20</td>
<td></td>
<td>-.07</td>
<td></td>
</tr>
<tr>
<td>DUR</td>
<td></td>
<td></td>
<td></td>
<td>-.36*</td>
</tr>
</tbody>
</table>

* $p < .05$
** $p < .001$
smoking was associated with a relatively short duration of time (DUR) spent smoking each cigarette \( (n = 32) \). This relationship is understandable given that early onset to smoking was related to high cigarette consumption as well.

The foregoing results present a general, although not particularly strong, trend of smoking activity. Early initiation to smoking was associated with a relatively high consumption of cigarettes, and a short duration of time spent smoking each cigarette. The final significant correlation occurred between the duration of time spent smoking each cigarette, and the time interval between cigarettes \( (n = 24) \). Longer durations of smoking were associated with shorter time intervals between cigarettes.

A factor analysis of dependent measures was conducted in order to further explore relationships among the topographical variables employed in this study. The principal factoring method with iteration was employed, followed by orthogonal rotation by the varimax method. Table 6 displays the factor loadings for each dependent measure on the one resultant factor. All variables loaded highly on one factor, which was explained best by the number of cigarettes smoked during the observation period. Consequently, the number of cigarettes was used as the primary dependent variable for most of the subsequent
Table 6

Factor Loadings of Dependent Measures

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cigarettes</td>
<td>.98</td>
</tr>
<tr>
<td>First cigarette</td>
<td>-.96</td>
</tr>
<tr>
<td>Puffs</td>
<td>.87</td>
</tr>
<tr>
<td>Duration</td>
<td>.89</td>
</tr>
<tr>
<td>Interval</td>
<td>-.83</td>
</tr>
</tbody>
</table>
analyses.

Table 7 displays the distribution of cigarettes lit by male and female smokers during completion of the questionnaires. A total of 23 women (58%) and 10 men (31%) smoked at least one cigarette. Among those people who did smoke, 73% consumed at least two cigarettes during the 45 minute observation period. The number of cigarettes smoked ranged from zero to three ($\bar{x} = .90$, s.d. = 1.07). Two smokers lit their first cigarette during the interview on consummatory habits. However, the smoking data for these subjects were excluded from analyses because the subjects had failed to smoke during the experimental period.

In summary, the smoking measures employed in this investigation loaded highly on one general factor of smoking behaviour, represented best by the variable, number of cigarettes.

**MAIN ANALYSES**

Effects of the three independent variables (Modeling, Gender, Ashtray) on smoking behaviour, were tested by means of an analysis of covariance using age and daily cigarette consumption as covariates. As discussed earlier, smokers from Company A and Company B differed significantly on the
Table 7

Distribution of Cigarettes Smoked By Male and Female Subjects

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number of cigarettes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Male</td>
<td>22</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
</tr>
</tbody>
</table>
three variables of age, years smoking, and number of cigarettes smoked per day. Table 8 presents the Pearson Product Moment correlations among these variables. Age and years smoking were highly related ($p < .001$), therefore only age and cigarettes per day were employed as covariates.

Results of the analysis of covariance appear in Table 9. There were no significant interactions among the independent variables, therefore only the main effects have been included in the table. As can be seen from Table 9, age of the subject was not significantly related to the number of cigarettes smoked; however, daily smoking rate was significantly correlated with the number of cigarettes which the subject smoked during the observation period. In other words, subjects who reported smoking a relatively high number of cigarettes per day tended to smoke a relatively high number of cigarettes during the experiment, $r(72) = .39, p < .001$.

Results for the three independent variables, after consideration of the impact of the covariates, were as follows.

**Effects of the Model**

The hypothesis concerning this independent variable predicted that a greater number of subjects would smoke, and at a higher rate, in the presence of a smoker model
Table 9
Analysis of Covariance on Number of Cigarettes

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covariates</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>2.28</td>
<td>1</td>
<td>2.28</td>
<td>2.76</td>
</tr>
<tr>
<td>Cig/Day</td>
<td>15.29</td>
<td>1</td>
<td>15.29</td>
<td>18.53 **</td>
</tr>
<tr>
<td>Main Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>10.91</td>
<td>1</td>
<td>10.91</td>
<td>13.21 **</td>
</tr>
<tr>
<td>Ashtray</td>
<td>2.53</td>
<td>1</td>
<td>2.53</td>
<td>3.07</td>
</tr>
<tr>
<td>Gender</td>
<td>3.96</td>
<td>1</td>
<td>3.96</td>
<td>4.80 *</td>
</tr>
<tr>
<td>2-Way Interactions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender Ash</td>
<td>.05</td>
<td>1</td>
<td>.05</td>
<td>.06</td>
</tr>
<tr>
<td>Gender Mod</td>
<td>.14</td>
<td>1</td>
<td>.14</td>
<td>.17</td>
</tr>
<tr>
<td>Ash Mod</td>
<td>.00</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>3-Way Interactions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender Ash Mod</td>
<td>2.78</td>
<td>1</td>
<td>2.78</td>
<td>3.37</td>
</tr>
</tbody>
</table>

* p < .05
** p < .001

Note: Data were also analyzed by multivariate analyses of covariance using all combinations of age, cigarettes per day, and years smoking as covariates; all six dependent measures were included. No significant results emerged beyond those reported in Table 9.
Table 8
Correlations Among Age, Years Smoking, and Cigarettes Per Day

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Years smoking</th>
<th>Cig/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.87**</td>
<td>.31*</td>
<td></td>
</tr>
<tr>
<td>Years smoking</td>
<td>.35**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < .01$
** $p < .001$
than in the presence of a non-smoker model. Table 10 displays the number of subjects who smoked, and the number of cigarettes lit, per condition. As evident from the table, 23 subjects (32%) smoked when in the presence of a model who smoked; in contrast, only 10 subjects (14%) smoked when in the presence of a model who refrained from smoking.

An analysis of covariance assessed the impact of the research assistant's smoking or non-smoking behaviour on the smoking rate of subjects, after consideration of the age of the subject, and daily cigarette consumption. Results indicated that the model's behaviour significantly influenced the number of cigarettes smoked by the subject during the experiment (p < .001). There was a higher rate of smoking (i.e., greater number of cigarettes lit) during those conditions when the research assistant smoked than when he/she refrained from smoking.

Specifically, an average of .44 cigarettes (s.d. = .81) were lit during the Non-smoker Model conditions compared to 1.36 cigarettes (s.d. = 1.17) during the Smoker Model conditions. Therefore, the behaviour of the research assistant, who either smoked or refrained from smoking in the presence of the subject, significantly influenced the subject's behaviour even after considering the subject's age and daily cigarette consumption.
Table 10

Distribution of Smoking By Condition

<table>
<thead>
<tr>
<th>Model</th>
<th>No Ashtray # S's</th>
<th>No Ashtray cig.</th>
<th>Ashtray # S's</th>
<th>Ashtray cig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-smoker</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Smoker</td>
<td>10</td>
<td>22</td>
<td>13</td>
<td>26</td>
</tr>
</tbody>
</table>
A question which arises from the foregoing result is whether observed smoking behaviour during the study actually deviated from the rate of smoking which could be expected on the basis of the subject's daily cigarette consumption. Results did support the hypothesis that the presence of a model who either smokes or does not smoke can influence the smoking behaviour of an observer. To further explore the effects of the model, an additional analysis was conducted in order to determine whether the model influenced a change in smoking rate.

For this analysis, a predicted rate of smoking per 45 minutes was computed for each subject given his/her daily smoking rate, and the fact that he/she would generally be awake 16 hours per day. A new variable (i.e., change in rate) was created to represent the difference between the observed smoking rate and the expected rate per 45 minutes. An analysis of covariance was then conducted on this new dependent measure. Results from the analysis are presented in Table 11. The covariates of age and daily smoking rate were not significantly related to the dependent measure. However, the Model factor did exert a main effect on the dependent measure.

During the Nonsmoker Model conditions, observed smoking rates were approximately .50 cigarettes lower than expected
Table 11

Analysis of Covariance on Change

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covariates</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>2.28</td>
<td>1</td>
<td>2.28</td>
<td>2.76</td>
</tr>
<tr>
<td>Cig/day</td>
<td>0.06</td>
<td>1</td>
<td>0.06</td>
<td>0.07</td>
</tr>
<tr>
<td>Main Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>10.91</td>
<td>1</td>
<td>10.91</td>
<td>13.21**</td>
</tr>
<tr>
<td>Ashtray</td>
<td>2.53</td>
<td>1</td>
<td>2.53</td>
<td>3.07</td>
</tr>
<tr>
<td>Gender</td>
<td>3.96</td>
<td>1</td>
<td>3.96</td>
<td>4.80 *</td>
</tr>
</tbody>
</table>

* $p < .05$
** $p < .001$
on the basis of daily cigarette consumption. In contrast, smoking rates were approximately .25 cigarettes higher than expected during the Smoker Model conditions. The Model factor, then, significantly altered the rate of smoking which would have been expected on the basis of subjects' daily cigarette consumption. Rates of smoking were depressed during conditions when a non-smoker model was present, and slightly inflated during conditions when a smoker model was present.

To summarize, results supported the hypothesis that a greater number of subjects would smoke, and at a higher rate, in the presence of a smoker model than in the presence of a non-smoker model. Furthermore, observed smoking rates were lower than expected, on the basis of reported daily cigarette consumption, during the Nonsmoker Model conditions, and higher than expected during the Smoker Model condition. Therefore, the model factor significantly influenced the elicitation, and rate of smoking behaviour.

**Effects of Gender**

The analysis of covariance tested whether gender of the subject influenced smoking behaviour, after consideration of the subject's age and daily smoking rate. As Table 9 indicates, male and female smokers differed significantly in terms of number of cigarettes smoked during the experiment
Specifically, female subjects smoked a greater number of cigarettes ($\bar{x} = 1.15$, s.d. = 1.14) than male subjects ($\bar{x} = .59$, s.d. = .98).

In order to further explore the question of sex differences in smoking behaviour, an analysis was conducted using only those male and female subjects who smoked at least one cigarette during the observation period. It was evident that a higher percentage of females (58%) had smoked during the experiment compared to males (31%). As a result, a significant difference on the dependent measure, number of cigarettes, may reflect a difference in the elicitation of smoking rather than an actual difference in smoking rate.

Upon re-analysing data for only those subjects who actually smoked during the experiment, the initial difference between men and women on number of cigarettes was no longer significant. Of course, the variability of this dependent measure was now reduced to a range of only two cigarettes (i.e., minimum = 1 cigarette, maximum = 3 cigarettes). Nevertheless, the major difference between men and women in terms of cigarette consumption was whether or not they smoked at all. Those men and women who chose to smoke during the study, smoked an equivalent number of cigarettes ($\bar{x}_1 = 1.9$, $\bar{x}_2 = 1.96$).

The present study did provide an opportunity to gather
exploratory data concerning gender differences in smoking topography. Therefore, a multivariate analysis of covariance was conducted in order to explore all parameters of smoking topography included in the investigation, although the factor analysis had shown number of cigarettes to be the most representative variable. Univariate tests on each dependent measure indicated that male and female smokers differed significantly on all dependent measures of smoking such that women displayed a higher smoking rate than men. Women began to smoke earlier, smoked a greater number of cigarettes, puffed more frequently, smoked each cigarette for a longer period of time and took shorter time intervals between cigarettes. Table 12 displays the means and standard deviations for each of the foregoing variables.

Data were then re-analyzed using only those men and women who actually smoked during the experiment, in order to further test whether there were reliable gender differences in smoking topography. Re-analyses showed that men and women who smoked at least one cigarette during the experiment, still differed significantly on the variables (a) puffs per cigarette, and (b) duration of time spent smoking each cigarette. Therefore, there was at least some evidence to indicate that the smoking topography of men and women differed such that women took more puffs per
### Table 12
Breakdown of Dependent Measures by Gender

<table>
<thead>
<tr>
<th>Measure</th>
<th>Males</th>
<th></th>
<th>Females</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\bar{x}$</td>
<td>s.d.</td>
<td>$\bar{x}$</td>
<td>s.d.</td>
</tr>
<tr>
<td>Number of cigarettes</td>
<td>0.59</td>
<td>0.98</td>
<td>1.15</td>
<td>1.14 *</td>
</tr>
<tr>
<td>Puffs</td>
<td>1.30</td>
<td>2.02</td>
<td>3.16</td>
<td>2.96 **</td>
</tr>
<tr>
<td>Duration</td>
<td>2.83</td>
<td>4.15</td>
<td>4.96</td>
<td>4.70 *</td>
</tr>
<tr>
<td>Interval</td>
<td>39.28</td>
<td>11.45</td>
<td>32.67</td>
<td>15.43 *</td>
</tr>
<tr>
<td>First cigarette</td>
<td>33.53</td>
<td>17.74</td>
<td>25.05</td>
<td>19.01 *</td>
</tr>
</tbody>
</table>

* $p < .05$
** $p < .01$
cigarette, and spent a longer time smoking each cigarette than men.

A related issue was whether there was a gender difference on the change variable (i.e., difference between observed and expected smoking rates). As evident from Table 11, men and women differed significantly on this variable. Smoking rates for men were lower than expected ($x = -.42$), whereas the rates for women were slightly higher than expected ($x = .12$). Generally, then, men deviated from their expected smoking rates more than women, and tended to smoke less than predicted. In contrast, women smoked at a rate slightly higher than expected on the basis of their daily cigarette consumption.

In summary, results from the investigation indicated that male and female smokers differed significantly in observed smoking behaviour. Smoking was elicited to a greater extent among women than men; furthermore, women puffed more frequently per cigarette, and spent a longer time period smoking each cigarette than men. Finally, men and women differed with respect to the change variable, such that men smoked less than expected, whereas women smoked slightly more than expected.

**Effects of Ashtray**

The prediction for this independent variable was that
more subjects would smoke, and at a higher rate, when ashtrays were available than when ashtrays were not available. Although 21 subjects (29%) smoked during the Ashtray conditions, compared to 12 subjects (17%) during the No Ashtray conditions, this difference was not reflected significantly by the number of cigarettes actually consumed by subjects. As Table 9 indicates, the Ashtray factor did not significantly influence the number of cigarettes lit during the observation period. There was a tendency for subjects to smoke more cigarettes when an ashtray was present ($\bar{x} = 1.11, \text{s.d.} = 1.11$) than when an ashtray was not present ($\bar{x} = .69, \text{s.d.} = 1.06$); however, results failed to achieve statistical significance.

Interactions

A relevant research question for this investigation was whether the three independent variables, Model, Gender, and Ashtray, would interact to influence smoking behaviour. Results from the analysis of covariance, conducted on the dependent measure, number of cigarettes, failed to uncover any significant interactions among the three variables of interest. Although there was not a significant interaction between the Ashtray and Model factors, the following multiple comparisons were tested because they had been outlined in advance.
Table 10 illustrates the number of subjects who smoked per condition and the number of cigarettes smoked per condition according to the Model and Ashtray factors. As the table indicates, the highest rate of smoking occurred during the Ashtray + Smoker Model condition; followed by No Ashtray + Smoker Model, and Ashtray + Nonsmoker Model. The lowest rate of smoking occurred during the No Ashtray + Nonsmoker Model condition.

The first prediction was that a greater number of subjects would smoke, and at a higher rate, during the pro-smoking condition (i.e., ashtray + smoker model) than during the ambiguous conditions (i.e., no ashtray + smoker model; ashtray + nonsmoker model), or the contra-smoking condition (i.e., no ashtray + nonsmoker model). Dunn's multiple comparison test for planned comparisons revealed that only the pro-smoking and contra-smoking conditions differed significantly ($p < .05$). Subjects exposed to the pro-smoking condition began to smoke earlier, lit a greater number of cigarettes, puffed more frequently, spent a longer duration smoking each cigarette, and took a shorter interval between cigarettes than subjects exposed to the contra-smoking condition. Furthermore, a total of 13 subjects (72%) smoked during the pro-smoking condition, compared to only 2 subjects (11%) exposed to the
contra-smoking condition. Results, then, supported the prediction that a greater number of subjects would smoke, and at a higher rate, during the pro-smoking condition than during the contra-smoking condition. However, there was no difference between the ambiguous conditions and the pro-smoking condition.

The second prediction was that there would be a higher rate of smoking during the ambiguous conditions when the model smoked, than when the model refrained from smoking (i.e., no ashtray + smoker model condition vs. ashtray + nonsmoker model condition). These two conditions provided conflicting cues for smoking in terms of the behavior of the model, and the availability of an ashtray. Multiple comparison tests failed to reveal significant differences between these conditions for any dependent measure.

The third prediction was that subjects would begin to smoke later during the contra-smoking and ambiguous conditions, than during the pro-smoking condition. However, differences in mean time to first cigarette were not significant.

To summarize, results failed to indicate that the independent variables interacted significantly to influence smoking behavior. Although there was no overall Ashtray x Model interaction, planned comparison tests supported the a
priori prediction that subjects would smoke at a higher rate during the pro-smoking condition than during the contra-smoking condition.

Summary

The main results of the study can be summarized as follows. An exploration of the relationships among the smoking measures revealed that all measures loaded highly on one factor, represented best by the number of cigarettes smoked during the observation period.

The major analysis of covariance, using age of the subject and daily smoking rate as covariates, revealed that the Model and Gender factors exerted significant main effects on the number of cigarettes consumed. Results supported the hypothesis that subjects would smoke at a higher rate in the presence of a smoker model than in the presence of a nonsmoker model. Furthermore, observed smoking rates were higher than expected (on the basis of daily cigarette consumption) during the Smoker Model conditions, and lower than expected during the Nonsmoker Model conditions.

Secondly, results from the analysis of covariance indicated that the smoking behaviour of men and women differed significantly. Smoking was elicited to a greater extent among women than men, women took more puffs per
cigarette than men, and spent a longer time period smoking each cigarette than men. Furthermore, the observed smoking rates for women were slightly higher than expected on the basis of daily cigarette consumption, whereas observed smoking rates for men were lower than expected.

The Ashtray factor did not significantly influence the number of cigarettes smoked during the observation period. However, there was a tendency for subjects to smoke more cigarettes during conditions where an ashtray was present, than during conditions where no ashtray was available.

Finally, results failed to reveal significant interactions among the three independent variables. A series of multiple comparison tests was conducted in order to test a priori hypotheses related to various cell means. The only significant difference which emerged supported the prediction that subjects would smoke at a higher rate during the pro-smoking condition (ashtray + smoker model) than during the contra-smoking condition (no ashtray + non-smoker model).

**Conclusions**

On the basis of results obtained from this investigation, the following conclusions can be stated:

1. The smoking measures employed in this investigation did not represent distinct entities of smoking behaviour.
Rather, the measures loaded on one factor, alone, represented best by number of cigarettes smoked.

2. The independent variables Model, Gender, and Ashtray did not significantly interact to influence smoking behaviour.

3. The behaviour of a model, who either smoked or refrained from smoking, significantly influenced the smoking behaviour of subjects.

4. There were significant gender differences in observed smoking behaviour.

5. The presence or absence of the physical environmental variable (i.e., ashtray), failed to significantly influence smoking rate.

6. The pro-smoking condition (ashtray + smoker model) elicited smoking among the greatest number of subjects, and was associated with the highest cigarette consumption, of the four experimental conditions employed in the study. The contra-smoking condition (no ashtray + nonsmoker model) elicited smoking among the fewest subjects, and was associated with the lowest smoking rates.

7. The ambiguous conditions did not differ significantly in terms of the number of cigarettes which were smoked.
CHAPTER 4

Secondary Analyses

This investigation collected a variety of descriptive information concerning the participants. For the most part, this information was not directly relevant to the experimental manipulation. Nevertheless, a selected portion of the descriptive data is presented here for the reader's interest.

The following three issues were considered most relevant to the main investigation. First, did smokers differ from non-smokers on the lifestyle, quality of life, or personality measures? Secondly, were personality variables or reasons for smoking significantly associated with smoking behaviour? Finally, were there gender differences in reasons for smoking?

Nonsmokers vs. Smokers

The major differences between the nonsmokers (i.e., ex-smokers + never smokers) and smokers occurred on the variables of (a) material well-being, (b) physical well-being, (c) depression, and (d) post-secondary education. Nonsmokers reported their material well-being
(e.g., financial situation) to be more favourable than that of smokers ($\bar{x}_1 = 9.68$, s.d. = 1.78; $\bar{x}_2 = 8.72$, s.d. = 1.8, $p < .05$). In addition, non-smokers reported their physical well-being to be superior to that of smokers ($\bar{x}_1 = 8.26$, s.d. = 1.99; $\bar{x}_2 = 6.93$, s.d. = 2.10, $p < .01$).

Non-smokers did score significantly lower than smokers on the depression subscale of the Basic Personality Inventory (Jackson, 1976) ($\bar{x}_1 = 1.87$, s.d. = 1.86; $\bar{x}_2 = 2.92$, s.d. = 3.38, $p < .05$). Nevertheless, both groups attained a mean score on the depression scale of less than 3.0 out of a possible score of 20 points. Therefore, both non-smokers and smokers scored at the low end of the depression scale, although non-smokers did appear slightly less depressed than smokers.

Finally, non-smokers had completed a greater number of years at a post-secondary institution than smokers ($\bar{x}_1 = 3.06$, s.d. = 2.22; $\bar{x}_2 = 1.50$, s.d. = 1.67, $p < .001$).

Generally, non-smokers in this investigation possessed a higher education than the smokers and reported their physical and material well-being more favorably than smokers. Furthermore, the non-smokers were less depressed than the smokers, although both groups scored relatively low on the depression scale.

The difference between non-smokers and smokers on the
variable of post-secondary education is consistent with large scale household surveys which have repeatedly found that non-smokers as a group are better educated than smokers (Health & Welfare Canada, 1979; USDHEW, 1980).

Although the question of personality differences between smokers and non-smokers was popular during the 1960's, the topic has virtually been abandoned in recent years. Therefore, it is difficult to relate the results of this investigation concerning the depression scores to current work in the field of smoking. Nevertheless, reports from the obesity literature have documented that obese individuals do have negative self-concepts (Bruch, 1973; Jacobs & Wagner, 1984). Likewise, a common finding in the alcoholism literature is that depression accompanies the abuse of this substance (Goldberg, 1981; Hatsuhashi, Owen, Pyle & Mitchell, 1982; Schuckit, 1972). Therefore, it may be the case that a negative self-concept or mild depression accompanies the abuse of tobacco as well.

**Personality, Reasons For Smoking and Smoking Behaviour**

Personality scores for smokers on the variables depression, anxiety, and alienation were not significantly related to daily cigarette consumption. Specifically, there were no significant correlations between reported number of cigarettes smoked per day and level of anxiety ($r = -0.09$).
depression \((r = .009)\), or alienation \((r = .19)\). Furthermore, personality scores were not significantly related to smoking behaviour during the experiment as measured by total puffs. The variable "total puffs" was employed here because it provided a greater range than number of cigarettes lit. Total puffs referred simply to the number of cigarettes multiplied by the number of puffs per cigarette. Table 13 displays the relevant correlations between personality and cigarette consumption (i.e., total puffs) for men and women. There was not sufficient evidence, therefore, to indicate that either daily cigarette consumption or observed cigarette consumption was associated with the subject's general level of anxiety, depression or alienation.

Insofar as reasons for smoking were concerned, category scores were not significantly related to daily cigarette consumption. Table 14 outlines the correlations obtained between each of the six categories for smoking and reported daily smoking rate. Similarly, category scores were not significantly related to observed smoking behaviour as measured by total puffs. Table 15 displays the correlations between each category and total puffs for male and female smokers.

In summary, neither personality nor reasons for smoking
Table 13
Correlations Between Personality and Total Puffs

<table>
<thead>
<tr>
<th>Variate</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>-.34</td>
<td>.04</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.28</td>
<td>.29</td>
</tr>
<tr>
<td>Alienation</td>
<td>-.20</td>
<td>-.17</td>
</tr>
</tbody>
</table>
Table 14
Correlations Between Reasons For Smoking and Daily Cigarette Consumption

<table>
<thead>
<tr>
<th>Pleasurable Tension</th>
<th>Stimulation</th>
<th>Handling</th>
<th>Relaxation</th>
<th>Reduction</th>
<th>Addiction</th>
<th>Habit</th>
</tr>
</thead>
<tbody>
<tr>
<td>-.06</td>
<td>.03</td>
<td>-.18</td>
<td>-.05</td>
<td>-.06</td>
<td>-.14</td>
<td></td>
</tr>
</tbody>
</table>
Table 15
Correlations Between Reasons For Smoking And Total Puffs

<table>
<thead>
<tr>
<th>Category</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulation</td>
<td>.05</td>
<td>.03</td>
</tr>
<tr>
<td>Handling</td>
<td>.13</td>
<td>.24</td>
</tr>
<tr>
<td>Pleasurable Relaxation</td>
<td>-.08</td>
<td>.14</td>
</tr>
<tr>
<td>Tension Reduction</td>
<td>.22</td>
<td>-.03</td>
</tr>
<tr>
<td>Psychological Addiction</td>
<td>.22</td>
<td>-.03</td>
</tr>
<tr>
<td>Habit</td>
<td>-.06</td>
<td>-.15</td>
</tr>
</tbody>
</table>
were significantly associated with daily cigarette consumption or smoking behaviour observed during the experiment. However, the personality variables and motivation for smoking were not intended to be major variables of interest insofar as the experimental manipulation of this investigation was concerned. A study designed specifically to test the role of these variables in smoking behaviour may indeed uncover significant relationships.

**Gender Differences on Reasons for Smoking**

Mean scores for each of the six categories of Horn's (1976) Reasons for Smoking Scale were compared for men and women. There were significant sex differences for each category except Handling. Women scored significantly higher than men on the categories of Stimulation, Pleasurable Relaxation, Tension Reduction, Psychological Addiction, and Habit. Table 16 provides the means and standard deviations for each category. Specifically, women scored between 11 and 12 points (possible total = 15) on the latter four categories which, in Horn's (1976) view, signifies a "high" score. In contrast, men failed to score in the "high" range on any category.

Table 17 outlines the five specific items on which men and women differed significantly. All three items of the
Table 16

Gender Differences on Reasons For Smoking

<table>
<thead>
<tr>
<th>Category</th>
<th>Males</th>
<th></th>
<th></th>
<th>Males</th>
<th></th>
<th></th>
<th>Males</th>
<th></th>
<th></th>
<th>Males</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>s.d.</td>
<td></td>
<td></td>
<td>x</td>
<td>s.d.</td>
<td></td>
<td></td>
<td>x</td>
<td>s.d.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stimulation</td>
<td>5.47</td>
<td>2.06</td>
<td></td>
<td></td>
<td>8.93</td>
<td>6.47 *</td>
<td></td>
<td></td>
<td>6.47 *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling</td>
<td>5.94</td>
<td>2.18</td>
<td></td>
<td></td>
<td>6.90</td>
<td>2.43</td>
<td></td>
<td></td>
<td>6.90</td>
<td>2.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleasure</td>
<td>10.22</td>
<td>2.20</td>
<td></td>
<td></td>
<td>11.43</td>
<td>2.07 *</td>
<td></td>
<td></td>
<td>11.43</td>
<td>2.07 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tension</td>
<td>8.88</td>
<td>3.06</td>
<td></td>
<td></td>
<td>12.28</td>
<td>2.49 *</td>
<td></td>
<td></td>
<td>12.28</td>
<td>2.49 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Addiction</td>
<td>8.72</td>
<td>3.01</td>
<td></td>
<td></td>
<td>11.70</td>
<td>5.80 *</td>
<td></td>
<td></td>
<td>11.70</td>
<td>5.80 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habit</td>
<td>5.28</td>
<td>2.36</td>
<td></td>
<td></td>
<td>11.58</td>
<td>8.49 *</td>
<td></td>
<td></td>
<td>11.58</td>
<td>8.49 *</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .01
<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>I light up a cigarette when I feel angry about something.</td>
<td>Tension Reduction</td>
<td>.01</td>
</tr>
<tr>
<td>When I feel uncomfortable or upset about something, I light up a cigarette.</td>
<td>Tension Reduction</td>
<td>.01</td>
</tr>
<tr>
<td>When I feel blue or want to take my mind off cares and worries, I smoke cigarettes.</td>
<td>Tension Reduction</td>
<td>.01</td>
</tr>
<tr>
<td>I smoke cigarettes automatically without even being aware of it.</td>
<td>Habit</td>
<td>.01</td>
</tr>
<tr>
<td>I find cigarettes pleasurable.</td>
<td>Pleasurable Relaxation</td>
<td>.05</td>
</tr>
</tbody>
</table>
Tension Reduction category elicited significantly different responses from men and women. Specifically, women endorsed more highly than men those reasons for smoking related to feeling angry, worried or upset. However, women also endorsed two items related to habit and pleasure more highly than men.

Therefore, clear gender differences in terms of motivation for smoking did not emerge from this investigation. Rather, results for women suggested that several categories represent important motivations for smoking (i.e., Pleasurable Relaxation, Tension Reduction, Psychological Addiction, Habit). In contrast, results for men indicated that as a group, no category was particularly important as a motivation for smoking.

To date, there has been limited research concerning gender differences in motivation for cigarette smoking. Investigators from the United Kingdom (Moreton & East, 1983) and the United States (Page & Gold, 1983) have reported that female smokers tend to endorse those reasons for smoking which are associated with tension reduction more highly than men. However, the present study indicated that women scored higher than men on a variety of reasons for smoking. This result suggests that a difference between men and women on the Tension Reduction subscale is not
necessarily the only reliable gender difference, nor the most important one. Further research will need to establish whether there are reliable differences in the motivation of male and female smokers, and whether reported motivation for smoking actually influences behaviour.

Summary

Neither personality nor reasons for smoking were significantly related to daily smoking rate. Moreover, personality variables and reasons for smoking were not significantly associated with subjects' smoking behaviour during the experiment. There was evidence to indicate that men and women reported reasons for smoking differently. In general, women endorsed most categories for smoking more highly than men. However, both men and women ranked Handling and Stimulation relatively low, and Tension Reduction and Pleasurable Relaxation relatively high.
CHAPTER 5

DISCUSSION

This investigation has examined the effects on smoking of a model's behaviour, the availability of ashtrays, and the gender of the subject. A model of the same sex either smoked three cigarettes or refrained from smoking in the subject's presence. During two of four different conditions, an ashtray was available to the subject; in the remaining two conditions no ashtrays were located in the room. Results from this manipulation were based on the observation of 72 smokers exposed to one of the four conditions (i.e., no ashtray + smoker model; no ashtray + nonsmoker model; ashtray + smoker model; ashtray + nonsmoker model). Subjects were observed while completing a series of questionnaires concerning their lifestyle and personality.

Although various stimuli in the environment have been assumed to influence smoking, there has been limited documentation of relationships between actual stimuli and subsequent variations in smoking behaviour. Environmental variables have not typically been hypothesized and tested as a matter of course in research on smoking. Therefore, the
topic of interest for this investigation represented a relatively untapped area for experimental research.

In addition, this investigation made use of a novel approach to the study of smoking. Research concerning environmental variables associated with smoking traditionally has been based on either self-report data or the observation of smokers under extremely artificial circumstances. For example, Antonuccio and Lichtenstein (1980) conducted a study investigating the impact of modeling on smoking by observing students in an experimental laboratory. Subjects were informed in advance that smoking was the focus of the research and that they were to smoke at least two cigarettes. It is difficult to estimate the potential impact of such information on an individual's behaviour. However, one can reasonably assume that subjects altered their natural behaviour to some degree, at least, in order to comply with the demands of the study. Therefore, results may not be generalizable to natural situations where smokers are not required to smoke.

In contrast to a strictly controlled experiment, one could conduct a natural field investigation in order to study environmental influences on smoking. This type of investigation, however, would be more appropriate as a way of testing the generalizability of environmental stimuli
which already have been investigated in an experimental study, rather than as a way of commencing an investigation of a new topic. Field study data would not necessarily mark an improvement over available self-report data at this time; this is because of the complexity of monitoring not only smoking in natural settings but also the myriad of stimuli which could be occurring simultaneously with those variables of interest.

The design employed in this investigation attempted to strike a balance between the strictly controlled experimental study and the natural field investigation. Subjects were not required to smoke and were unaware that their smoking activity was being observed. The experiment was conducted at the subject's workplace rather than in a laboratory. Nevertheless, it was still feasible to manipulate independent variables and to observe their effects on the dependent measures. Finally, experimental conditions were randomly ordered. The design of the study thus permitted the retention of several critical features of a true experiment, while taking place in a familiar environment.

Another novel aspect of the study was the choice of sample. Traditionally, subject pools for research on smoking have been drawn from a population of either freshmen
students or smokers attending cessation programs. Both populations are unrepresentative of the mainstream of cigarette smokers. On the one hand, students tend to be relatively inexperienced and light smokers. On the other hand, smokers attending cessation programs represent long-term, heavy smokers with at least some desire to alter their behaviour. Adult smokers who are not seeking treatment have rarely been included in behavioural research on smoking, despite the fact that this group represents the largest proportion of regular smokers (Health & Welfare Canada, 1979). In addition, most research on modeling has studied men only. The participation of both men and women in this study thus marked a major advance in behavioural research on modeling.

In summary, this investigation explored a relatively new topic of interest in the field of smoking research, employed a novel subject sample, and was conducted at the subject's place of work. Before discussing results from the investigation, a few limitations of the design should be addressed.

First, the study was rather limited in scope. The decision to limit the experiment to three independent variables arose from the realization that the subject sample was going to be smaller than anticipated. It was thus
decided to restrict the number of independent variables to three, rather than include a greater number of variables and diminish cell size. The investigation did explore one characteristic of the subject, one characteristic of the social environment, and one characteristic of the physical environment. However, there still remain additional types of variables (e.g., physiological dependence, motivation) which require systematic investigation within the context of an environmental study. Moreover, modeling and the presence of ashtrays represent only two types of social and physical environmental supports for smoking. Future investigations need to explore other environmental supports such as social interaction, vending machines, or signs.

Secondly, the model and the observer were the same individual in this study. The model was solely responsible for observing the smoking behaviour of subjects for the majority of experimental sessions. This limitation was counteracted in part by (a) spot checks of the research assistants, and (b) the fact that research assistants were unaware of the hypotheses associated with the study and the smoking status of subjects. Nevertheless, the design might be improved by the addition of an unobtrusive observer for all or most sessions.

Finally, this investigation represents a stepping
stone to a natural field study. The approach marks an improvement over past research on smoking behaviour, which has relied on self-report or obtrusive techniques. Thus, the investigation necessarily has limited generalizability.

**Measures of Smoking**

In general, correlations among the five dependent measures ranged from low to moderate in magnitude, despite the fact that four of the 10 correlations attained statistical significance. The strongest relationship existed between the number of cigarettes lit and the time before the first cigarette (r = -.58). Subjects who began smoking relatively early during the experimental conditions tended to consume a high number of cigarettes during that period. Although one might expect high consumption to also be associated with a short interval between cigarettes, the respective correlation (r = -.13) failed to support this expectation. The significant relationship between the number of cigarettes and the time of onset to smoking replicated results obtained by the author in a previous investigation (Bolla, 1979).

In the present study, early initiation to smoking was significantly related to both the number of cigarettes lit and the duration spent smoking each cigarette. The latter correlation was smaller in magnitude and opposite in
direction to the relationship obtained in an earlier observational study (Bolla, 1979). The observation of smoking topography is a recent development in the field of smoking research. Therefore, it is not possible to compare most results of the present study to other published reports. However, the association between high consumption and early onset to smoking did replicate the author's earlier work. Additional relationships among topographical variables can only be clarified by subsequent investigation.

It is conceivable that the 45 minute observation period used in this study was too short a time period to detect strong relationships among topographical variables. For example, the potential range for number of cigarettes was necessarily limited. In addition, data for the interval between cigarettes could not be obtained because many subjects (67%) failed to smoke two cigarettes.

Nevertheless, this investigation did underscore one important issue. There are at least some topographical components of smoking which can be measured with minimal intrusion and high reliability. In addition, these variables are sensitive to the manipulation of environmental influences to smoke and as such, represent useful indices of smoking behaviour. Biochemical measures of smoking currently are favoured as an improvement over the
traditional use of self-reports for the assessment of smoking behaviour. However, biochemical measures also possess disadvantages, such as high expense and the need for trained technicians and laboratory facilities. Furthermore, the techniques require intrusion on the subject in order to collect blood, urine, or saliva samples. Biochemical measures are perhaps best suited to evaluation studies of smoking cessation programs and studies investigating the effects of smoking and passive smoking. These types of studies require reliable methods of assessing the degree of intake of harmful constituents and whether a client has been smoking.

In contrast, researchers concerned with investigating the impact of environmental influences need to select dependent measures, which are sensitive to such influences and can be measured without intrusion or complicated technology. To date, a pool of such topographical variables and techniques for their reliable measurement has not been developed. The determination of a parsimonious set of dependent variables and solid techniques to assess such variables would greatly aid behavioural analyses of smoking.

The present investigation employed five topographical variables, which were measured in an unobtrusive and comparatively inexpensive manner. In this study, the five
dependent measures loaded on one factor of smoking, which was represented best by the number of cigarettes lit during the experiment. Behavioural investigations seeking primarily to test the effects of particular variables on smoking, may obtain sufficient information solely from monitoring the number of cigarettes smoked. The choice of dependent measures, however, depends on the goals of the investigation and must be selected accordingly. For example, an investigation which attempts to assess the pharmacological effects of smoking may find that the number of puffs or the depth of inhalation are the most useful variables to monitor.

**Effects of Model, Gender, and Ashtray**

Analyses of covariance failed to reveal any significant interactions among independent variables. The absence of significant interactions indicated that the effect of the model's behaviour, for example, did not depend on whether an ashtray was present or whether the subject was male or female. Four interactions were tested in this investigation and none attained statistical significance (i.e., Model x Ashtray, Model x Gender, Ashtray x Gender, Model x Ashtray x Gender).

It has recently been suggested that potential influences on smoking should be tested simultaneously (Ray
et al., 1982; Nellis et al., 1982). This advice stems from a belief that smoking is a complex phenomenon maintained by a myriad of factors which interact in important ways to influence smoking. Presumably, then, the merit of a factorial design is its potential to uncover interactions between factors. Nevertheless, no significant interaction emerged from the present investigation. Furthermore, those few studies which have tested the effects of more than one independent variable have likewise failed to uncover significant interactions. For example, Bolla (1979) and Antonuccio and Lichtenstein (1980) found that the level of daily smoking (light, heavy) did not interact with a modeling factor. In addition, Bolla (1979) concluded that the personality variables of locus of control, empathy, socialization, social anxiety, and physical anxiety did not interact significantly with modeling to affect smoking behaviour. Although the modeling factor was defined in different ways for each study, earlier investigations as well as the present one failed to detect significant interactions involving modeling. Moreover, the present study additionally failed to uncover a significant interaction between gender of the subject and the physical environmental factor (i.e., ashtray).

Given the assumed importance of interactions among
variables in the maintenance of smoking, it is important to consider possible explanations for the lack of supporting data. Few studies have actually tested the effects of interactions among factors on smoking. Therefore, nonsignificant results to date may be a reflection of the type of factor which has been selected thus far.

Alternatively, nonsignificant interactions may reflect the power of some factors to limit the influence of others. In this investigation, as with other studies of modeling and smoking, subjects were never observed alone. Although one can look statistically at an Ashtray x Gender interaction, one cannot take into account the possible impact of simply being in the presence of another individual. Research to date has failed to show that personality, gender, a physical support for smoking, or daily smoking rate interact with each other or the model's behaviour to influence smoking.

The foregoing considerations can only be clarified by investigations which continue to explore factors which influence smoking. It is conceivable that certain factors do not have the same influence when an individual is alone as when other people are present. That is, certain factors may interact with physical environmental supports or gender when an individual is alone, but not when he/she has the opportunity to observe the behaviour of others.
Generally, therefore, the complexity and tenacity of smoking may stem not only from the sheer number of influences on smoking but also from the variability of processes of influence across conditions. This idea will be addressed subsequently during the discussion of results for each independent variable.

**Effects of the Model**

The smoking or nonsmoking behaviour of the model significantly influenced the smoking behaviour of male and female subjects. Subjects smoked a greater number of cigarettes during conditions when the model smoked compared to conditions when the model refrained from smoking. These results were consistent with previous research, which has shown that modeling can influence consummatory behaviour (Caudill & Lipscomb, 1980; Caudill & Marlatt, 1975; Antonuccio & Lichtenstein, 1980). Moreover, subjects smoked less than their expected rates when in the presence of a nonsmoker model and more than their expected rates when in the presence of a smoker model. The foregoing effects on smoking were obtained after consideration of the age and daily smoking rates of subjects.

In Bandura's (1971, 1977) language, the model's smoking or nonsmoking behaviour acted as a social prompt, which released a learned behaviour in the observer. The behaviour
of smoking was released more frequently (i.e., more people smoked) during conditions when the model smoked than when the model did not smoke. In addition, the rate of smoking during the two conditions differed such that a greater number of cigarettes was consumed when the model smoked than when the model refrained from smoking.

Social facilitation theory states that the sight or sound of others engaged in an activity not only releases that behaviour in others but also augments the rate of the behaviour (Allport, 1972; Wheeler, 1968; Zajonc, 1971). Some support for this theory was provided by the present investigation. Although this investigation did not specifically test the question of whether smoking occurs at a higher rate when in the company of other smokers than when alone, results did indicate that smokers consumed more cigarettes than expected when in the company of another person who was smoking. A logical extension of results would predict that smokers do, in fact, have a greater tendency to smoke, and to smoke at a higher rate, when in the company of other smokers than when alone.

Finally, the presence of an individual who either smoked or did not smoke affected the behaviour of subjects even when daily cigarette consumption and age were considered. Bandura (1977) proposed that characteristics of
the model and the observer are overshadowed by the effects of the model's behaviour, especially when the behaviour is functional. In this investigation, gender did not interact with the modeling factor; therefore, this particular characteristic of the subject did not significantly influence susceptibility to the modeling effect.

Furthermore, the modeling effect held across subjects who had varying levels of daily cigarette consumption and who were of varying ages. Therefore, the model's behaviour did, in fact, overshadow characteristics of the subject as predicted by social learning theory. This investigation did not, however, vary characteristics of the model. In all cases, the model was the same sex as the subject.

Furthermore, all male subjects were exposed to the same male model, while all female models were exposed to the same female model. Further investigations will need to determine whether particular characteristics of the model are important factors in response facilitation.

The observed variation in smoking behaviour attributable to the modeling factor was particularly striking in this investigation, given the limited observation period and the type of model employed. Subjects were observed for 45 minutes, did not know the model, and did not interact with the model after preliminary
instructions. There is good evidence, therefore, that the behaviour of a smoker or nonsmoker can influence smoking rates among observers on a short-term situational basis when there is no interaction between individuals. These results are not consistent with those of Ossip & Epstein (1980) who failed to demonstrate a modeling effect in the absence of social interaction. However, because the present investigation employed a subject sample which was more than twice the size employed by Ossip & Epstein (1980), it represents a stronger test of modeling in the absence of social interaction than any previously employed.

The relationship between the model's smoking behaviour and the observer's smoking behaviour in this study was not an immediate or consistent stimulus-response relationship. The research assistants smoked three cigarettes in the presence of 36 subjects; however, only seven subjects (19%) likewise smoked three cigarettes. The model's smoking behaviour served primarily to (a) release a higher occurrence of smoking, and (b) increase the rate of smoking among subjects.

Mausner & Platt (1971) spoke in a general way about the influence of environmental supports on smoking. Basically, the organism and the environment interact such that social and physical stimuli in the environment provide invitations
and supports for smoking. Furthermore, the sharing of cigarettes, and the sight of other people smoking, may act as specific stimuli to smoke.

The sight of someone else smoking, however, is not a single stimulus. Rather, stimuli such as the sight and smell of smoke and the sight of cigarettes are present when one observes another individual who is smoking. In the present investigation, the Smoker Model conditions contained a greater number of stimuli to smoke than the Nonsmoker Model conditions. The strength of the modeling effect, therefore, may result not only from the frequency of past associations with smoking but also from the multiplicity of stimuli involved.

Furthermore, the behaviour of a model likely conveys implicit messages regarding the appropriateness of certain behaviours. The models in this investigation did not verbally or physically encourage the subject to smoke. Nevertheless, implicit messages concerning the appropriateness of smoking were probably conveyed to the subject by the model's own behaviour.

When the model exhibited smoking, he/she implicitly indicated to the subject that smoking was appropriate even though ashtrays may not have been available. When the model refrained from smoking, he/she may have conveyed the message
that smoking was inappropriate even though ashtrays may have been available. Messages were most clear to the subject when the ashtray cue was consistent with the model's behaviour. In the absence of a model, subjects may have relied on physical cues in the environment (e.g., ashtrays, signs) in order to determine the appropriateness of smoking.

This investigation was not designed to test specific processes of influence, such as learning, social facilitation, or Pavlovian conditioning, which may be involved in the relationship between a model's behaviour and an observer's behaviour. Rather, the study tested whether environmental factors do, in fact, exert a direct impact on cigarette smoking. Implications of the results are similar regardless of the specific processes involved. Namely, certain environmental events, such as being in the presence of a smoker, can significantly affect the occurrence and rate of cigarette consumption by the observer. This type of situation can therefore represent a "high risk" occasion for the individual who is attempting to control his/her cigarette intake or abstain from smoking. High risk situations which encourage smoking and promote a temporary increase in the rate of smoking need to be identified, and subsequently addressed in treatment programs.

Investigations seeking to determine the causal links
involved in the relationship between an environmental event and behaviour may discover that social learning in addition to other nonpharmacological factors (e.g., drug-compensatory conditional responses, attitudes) work together to influence the elicitation and rate of smoking behaviour. It is unlikely that any one type of process will adequately account for all occurrences of a relationship between an environmental event and behaviour.

An important issue related to the investigation is whether models in the media can support the continuance of smoking or cause variations in smoking rate among observers. This investigation demonstrated that a live model in the subject's presence can influence smoking behaviour. However, smokers are also exposed to a variety of models who, though not physically present, are still visible to the observer (e.g., characters on television, film, advertisements). Models such as these may support the continuance of smoking by implicitly endorsing the behaviour as acceptable. They may also influence the rate of smoking among viewers. The issue of modeling and cigarette smoking thus transcends specific situations such as the one employed in this study. Researchers interested in preventing the onset of cigarette smoking and deterring the continuance of smoking must address the effects of modeling in specific
situational contexts as well as in general contexts such as the media.

Summary

Results for the modeling factor were consistent with previous research indicating that the behaviour of a model can influence the consummatory behaviour of an observer. Previous research has typically studied modeling under conditions where the model interacts with the observer. This investigation, however, provided evidence that modeling exerts an impact on smoking during conditions of no social interaction as well.

Furthermore, characteristics of the subject (i.e., age, gender, daily smoking rate) failed to moderate the effects of modeling. Results were thus consistent with Bandura's (1977) proposal that characteristics of the subject are overshadowed by the model's behaviour.

The presence of another individual who is smoking, exerts an influence on the behaviour of an observer in at least two ways. First, the subject observes multiple stimuli which have been associated in the past with smoking (e.g., smoke, cigarettes, matches). Secondly, the model conveys a message through his/her own behaviour that smoking is appropriate during a particular situation. It was suggested that the impact of modeling on smoking,
transcends situations where a live model is present. For example, smokers are regularly exposed to models in the media who may, in fact, support the continuance of cigarette smoking or influence actual smoking rates.

Effects of Gender

Results of the present study revealed that male and female subjects differed in observed smoking behaviour. First, a greater number of women smoked during the experiment than men. Secondly, women took more puffs per cigarette and smoked their cigarettes for a longer period of time than men. Finally, although men and women did not differ with respect to daily cigarette consumption, the observed smoking rates for women were higher than expected, whereas the rates for men were lower than expected. These results point to a difference between men and women in terms of (a) the release of smoking behaviour, and (b) smoking topography.

There is little research to date which has addressed gender differences in smoking behaviour. One study did report gender differences on the topographical variables of number of cigarettes smoked and puff duration (Epstein, Dickson, Ossip, Stiller, Russell & Winter, 1982). In this case, men smoked more cigarettes and took longer puffs than women. There were no gender differences reported for number
of puffs per cigarette. Results from the study thus differ from those obtained in the present investigation. In the Epstein et al. study (1982), all subjects were required to smoke. Moreover, subjects smoked through a connector, which was wired to another mechanical apparatus monitoring smoking behaviour. The purpose of the study was to investigate interrelationships among topographical variables and changes in heart rate. However, it cannot be assumed that smoking behaviour observed under such conditions is equivalent to typical behaviour. Research must also determine whether men and women differ in smoking behaviour under natural conditions and whether smoking topography varies across situations.

The most interesting gender differences observed in the present investigation were that the experimental situation released smoking to a greater extent among women than men and appeared to cause an increased smoking rate among women. One explanation of these results is that the female subjects were more dependent on cigarettes than the male subjects. However, this explanation is unlikely given that the male and female smokers did not significantly differ in terms of daily cigarette consumption. In fact, men reported a slightly higher daily smoking rate than women and also had been smoking for a significantly greater number of years.
than women.

An alternative explanation is that the female subjects were allowed less freedom to smoke during work hours than men, leading female subjects to use the experimental session as an opportunity to smoke for reasons of deprivation (e.g., psychological, physiological). However, all subjects were white collar workers employed in "desk job" positions. Neither company placed restrictions on smoking at one's desk or in areas of the building. Furthermore, self-monitoring data obtained from employees enrolled in a workplace smoking cessation program, showed that both male and female employees smoked at will throughout the day. Therefore, it is unlikely that female subjects arrived at their appointments in a stronger state of deprivation than men. Nevertheless, the study might have been improved by determining the time of the subject's last cigarette.

A third explanation of the higher incidence of smoking among women than men is that women were more anxious in the situation and responded by smoking. This investigation was not designed to test the relationship between affect or reported motivation for smoking and actual smoking behaviour. Therefore, it is difficult to either dispute or confirm this explanation. On the one hand, the female subjects did score higher than males ($p < .01$) on the
anxiety subscale of the Basic Personality Inventory (Jackson, 1976). Moreover, the female smokers endorsed the tension reduction subscale of the Reasons for Smoking Scale (Horn, 1976) more highly than men (p < .01). On the other hand, these results do not necessarily mean that (a) women perceived the experimental situation as more anxiety producing than men, and (b) women smoked during the experiment in order to reduce anxiety or tension.

If one were interested in establishing a relationship between reasons for smoking and actual behaviour, a number of facts would have to be established. First, it would have to be determined that smokers, who often have difficulty reporting their smoking rates reliably, can accurately report motivations for smoking. Secondly, it would have to be demonstrated that a given situation is indeed perceived in a particular way (e.g., pleasurable, tense) and that an individual smoked in order to reduce or enhance the effects of that experience. On the basis of this study, it cannot be concluded that the women smoked to a greater extent than the men for reasons of anxiety.

Nevertheless, something about the experimental situation seemed to elicit a higher rate of smoking among women than men. The experimental situation was social in the sense that another person was present at all times. It
may be the case that the frequency of smoking in the company of others may be higher for women than for men. According to a habit conceptualization of smoking (Hunt & Matarazzo, 1970; Logan, 1970), women would tend to release smoking more often than men when placed in a situation where they had, in fact, more experience smoking. The association between smoking and the presence of others would not arise solely from a need to reduce tension; rather, a variety of functions could be served by smoking in social contexts. Mausner & Platt (1971) suggest that smoking when others are present can serve to enhance warmth and cohesion among group members.

One isolated reason, such as the reduction of anxiety, is inadequate to explain the observed gender difference in the occurrence and rate of smoking. This study cannot unequivocably establish an alternative explanation. However, it is reasonable that differences in the release of smoking may stem from (a) differential past associations between situations and smoking, and (b) differential functions which smoking serves in particular situations. Perhaps other types of conditions will be found to encourage men to elicit smoking more frequently than women, or to smoke at higher rates than expected.
Summary

This investigation provided evidence to suggest that men and women differ on at least two variables of smoking topography. Women took a greater number of puffs per cigarette and spent a longer time smoking each cigarette than men. In addition, a greater percentage of women smoked during the study than men. Although a tension-reduction explanation of this difference is inviting, there is no evidence that women either perceived the experiment as more anxiety-producing than men or that they smoked solely because of this reason. Rather, a number of additional factors, such as experience or the functions served by smoking, likely contributed to the observed difference. It was suggested that various types of situations may differentially induce smoking among men and women and influence smoking rate. Nevertheless, certain processes of influence within a given situation (e.g., modeling) are not moderated by the gender of the smoker.

Effects of Ashtray

The presence or absence of ashtrays failed to significantly influence the smoking behaviour of subjects. In addition, the Ashtray factor did not interact significantly with either the Modeling or Gender factors. Although results failed to attain statistical significance,
subjects did tend to smoke at a higher rate when an ashtray was available than when one was not available. Therefore, a study employing a larger sample than this investigation may provide sufficient statistical power to uncover a significant effect for the ashtray variable.

To date, the relationships between physical environmental factors and smoking have been assumed rather than tested. Consequently, it is premature to discount the contribution of physical supports to the maintenance of smoking on the basis of this investigation.

Ashtrays represent a common physical support in the smoker's environment. According to Mausner & Platt (1971), such supports create a conducive environment for the continuance of smoking. Furthermore, the frequency of smoking in the presence of ashtrays would logically be high. Therefore, it was reasonable to expect a significant association between the presence or absence of ashtrays and smoking behavior in this study.

It may be the case that physical environmental supports for smoking are most influential when the subject is alone. When in the presence of others, the smoker may react primarily on the basis of other people's behavior than on the basis of physical cues in the environment. At present, it still is not known whether (a) physical supports for
smoking affect smoking behaviour when individuals are alone, or (b) whether combinations of physical supports (e.g., ashtrays + signs permitting smoking) are required in order to influence behaviour.

In this investigation, the lowest rate of smoking occurred when both the Ashtray and Model factors were consistent and provided a nonsupportive environment for smoking. Similarly, the highest rate of smoking occurred when both the Ashtray and Model factors provided a supportive environment. Environmental supports for smoking do not always occur in isolation; thus it is important to investigate the effects of combinations of factors on smoking. Results from the study illustrate that the optimal way to deter smoking is to present a consistent anti-smoking message across environmental stimuli. The absence of ashtrays, coupled with the presence of a nonsmoking model, not only reduced the number of specific stimuli to smoke but also implicitly conveyed the message that smoking was not appropriate. In order to virtually eliminate smoking, the model and ashtray supports needed to be consistent. For example, only three cigarettes were lit during the No Ashtray + Nonsmoker Model condition, compared to 13 cigarettes during the Ashtray + Nonsmoker Model condition (i.e., condition with the second lowest smoking rate.)
Summary

Although results failed to support the hypothesis that the presence or absence of ashtrays significantly influences smoking, this does not mean to say that physical supports are unimportant in the maintenance of smoking. For example, it was suggested that combinations of physical supports (e.g., ashtray + sign) may influence behaviour. Moreover, specific physical supports may be important motivating factors to smoke or not to smoke when the smoker is alone. Finally, a large sample of subjects may be required to provide adequate statistical power to uncover significant results for this factor.

Results also highlighted the importance of uniformity across stimuli as a means of effectively deterring smoking. The lowest rate of smoking occurred during the No Ashtray + Nonsmoker Model condition. In this condition, there were no explicit environmental stimuli to smoke. Moreover, smoking was not only inappropriate, given the model's nonsmoking behaviour, but also inconvenient due to the absence of ashtrays.

Concluding Comments

Results from this investigation demonstrated that a social support such as the presence of another person, who is smoking or not smoking, can significantly affect the
behaviour of adult smokers. Although certain types of situations may differentially affect the release of smoking among men and women, specific factors therein, such as modeling, influence the behaviour of smokers across gender. Gender differences may be most relevant when considering broad contexts of smoking (e.g., general reasons for smoking, situations which elicit smoking), rather than for specific contexts such as the influence of certain social and physical environmental supports.

Environmental factors which maintain smoking and cause variations in smoking rates need to be understood in order to develop effective prevention and intervention programs. Moreover, interrelationships among environmental factors and additional types of factors (e.g., physiological, psychological, situational) must be investigated because smoking is not a behaviour which can be explained by a univariate theory. Finally, environmental factors associated with cigarette smoking operate on several levels. Although this study addressed specific situational variables, broader societal forces and supports for smoking also are at work to influence the onset and maintenance of smoking (e.g., advertising, social climate, legislation).

Implications of the present investigation touch not only the environmental modification of smoking but also
smoking cessation. Consistent messages across cues provided the strongest deterrent for smoking in this investigation. Environmental management of smoking, therefore, needs to ensure consistency across available supports for non-smoking. For example, the establishment of no-smoking sections through the use of signs will be minimally effective when ashtrays are still available and people still smoke in those areas without consequence. Environmental psychologists need to study smoking in public settings such as waiting rooms and restaurants, and to determine the most efficient methods of deterring smoking in the communal environment.

The smoking cessation therapist can also use information concerning physical and social supports for smoking. For example, clients can be encouraged to reduce the supports for smoking in their immediate environments and to increase supports for non-smoking. Active steps can be taken by smokers to alter their immediate physical environments in ways to promote non-smoking (e.g., removal of ashtrays, establishment of personal non-smoking areas at home and work). These types of techniques are straightforward, inexpensive and provide a supportive environment in which the individual can practice non-smoking. Alterations to one's immediate physical environment coupled with broader environmental forces such as social pressure
and legislation can work together to deter smoking.

The social environment of the client can also be altered to assist the cessation of smoking. For example, friends and family members can become involved in the client's treatment program through behavioural contracting. Those family members who smoke should agree to refrain from smoking in the client's presence, and from providing cigarettes to the client. Furthermore, friends and family should be involved in a very positive way to encourage and reinforce the client's nonsmoking behaviour. In these ways, the client's social and physical environments can be used to his/her advantage, rather than continue to represent forces which support the continuance of smoking.
Appendix 1

Recruitment of Companies

The Canadian Council on Smoking and Health was instrumental in the recruitment of companies to participate in this investigation. Representatives from middle or upper management at several companies in Ottawa had contacted the Council at some point during the previous year regarding anti-smoking literature or other related information on smoking.

The author then contacted five of these representatives to explain the nature and requirements of the study. Each of the initial contact people were favourable to the project. However three of the companies ultimately were unable to participate due to staff shortages. Two companies had instituted hiring freezes and were facing the prospect of staff cutbacks due to the recession. Therefore it was not feasible for them to approve time off during the day for employees to participate in the study. The third company was initially favourable to the study, however the complement of staff fluctuated dramatically throughout the year because most of their employees travelled a great deal. Therefore, it would have been difficult to conduct the type
of investigation where one needed to schedule individual appointments with subjects.

Two businesses ultimately agreed to participate and the recruitment of companies was discontinued when it became apparent that 100 subjects could be obtained from them. Generally, reaction to the project was very favourable from all companies contacted. Economic hardships during Fall and Winter of 1982-83 limited the ability of the companies to ultimately participate.

In return for participation, the author offered a two-week smoking cessation program for employees at each company after completion of data collection.
Appendix 2

Recruitment of Subjects

The recruitment of subjects at each company differed slightly, therefore each will be discussed separately. Company A did not wish to advertise the study company wide. The major concern was that too many employees would respond which would mean that some individuals might have to be turned away. As an alternative, the following announcement was sent to 80 employees (50 men, 30 women).

"Several months ago, ______ agreed to assist a research team in collecting data for a study on Quality of Life. You have been selected to participate in the study. We are hoping everyone responds favourably and will show a willingness to participate. This project is being supported by Health and Welfare Canada and is being conducted by a researcher from the University of Western Ontario.

Participation involves completing a few general questionnaires and a brief interview concerning various topics related to Quality of Life (e.g., exercise, interpersonal relations, smoking and drinking patterns, job characteristics). The questionnaire and interview
will take place in private and will last approximately one hour during the working day. All of your responses are anonymous and remain confidential. Details of the study will be provided at the end of the project when you will receive a brief summary of results. If you would like to participate, please sign the attached consent form. Kindly return the consent form and the completed Demographic Information survey to__________. You will be notified as soon as possible about the date and time for participation. Your cooperation in this project is very much appreciated."

Attached to the announcement was a demographic sheet (Appendix 3) which was to be completed by the employee if he/she wished to participate. Initially, 52 positive replies were received (30 men, 22 women). An additional 20 requests were circulated which generated 11 further subjects. Two people who had been willing to participate left the company by the time when they were called to arrange an appointment. Therefore a total of 61 employees participated from Company A.

At the time when Company B joined the study, there was no longer a need to include nonsmokers because 28 had already participated from Company A. The greatest need at
this point was to recruit additional smokers for the study.

The major concern of company B was that the advertisement should specifically request smokers. In this way, no volunteers would have to be turned away from the study. A notice was published in the company's monthly newsletter advertising the study. The notice was the same as that used for Company A except that now the investigation was said to be specifically studying the "quality of life of smokers".

A total of 45 employees responded. Three of these people were absent for extended periods of time when the study was being conducted on site. This left a total of 42 participants (39 smokers, 3 nonsmokers) from Company B.

There were no drop-outs from the study in terms of employees who intially wished to participate and then changed their minds later. However, five potential participants were lost for other reasons (termination of employment, out of town).
APPENDIX 3
Demographic Information Sheet

DEMOGRAPHIC INFORMATION

Please answer the following questions.

1. Sex: Male ( ) Female ( )

2. Age: ____________

3. Marital Status: single ( ) married ( ) separated ( ) divorced ( ) common law ( ) widow ( )

4. a) Last grade completed in public and/or high school: ____________
    b) Number of years of community college and/or understry education: ____________

5. a) Your current occupation: __________________

6. a) From the following statements, please check the one that best describes how often you drink coffee:
    never or less than once a year ( )
    once a month or less ( )
    several times a month ( )
    once or twice a week ( )
    nearly every day ( )
    several different times each day ( )

   b) Please indicate the number of cigarettes you smoke on an average day: ______

   c) From the following statements, please check the one that best describes how often you drink alcohol:
    never or less than once a year ( )
    once a month or less ( )
    several times a month ( )
    once or twice a week ( )
    nearly every day ( )
    several different times each day ( )

145
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Quality of Life Questionnaire - D.
David R. Evans, Joan E. Burns and Wendy E. Robinson

BPI
Douglas N. Jackson 976
REASONS FOR SMOKING SCALE

I am going to read some statements made by people to describe what they get out of smoking cigarettes. How often do you feel this way when smoking them? Choose one number on the card between "5" (always) and "1" (never) for each statement.

A. I smoke cigarettes in order to keep myself from slowing down.
B. Handling a cigarette is part of the enjoyment of smoking it.
C. Smoking cigarettes is pleasant and relaxing.
D. I light up a cigarette when I feel angry about something.
E. When I have run out of cigarettes I find it almost unbearable until I can get them.
F. I smoke cigarettes automatically without even being aware of it.
G. I smoke cigarettes to stimulate me, to perk myself up.
H. Part of the enjoyment of smoking a cigarette comes from the steps I take to light up.
I. I find cigarettes pleasurable.
J. When I feel uncomfortable or upset about something, I light up a cigarette.
K. I am very much aware of the fact when I am not smoking a cigarette.
L. I light up a cigarette without realizing I still have one burning in the ashtray.
M. I smoke cigarettes to give me a "lift".
N. When I smoke a cigarette, part of the enjoyment is watching the smoke as I exhale it.
O. I want a cigarette most when I am comfortable and relaxed.
P. When I feel "blue" or want to take my mind off cares and worries, I smoke cigarettes.
Q. I get a real gnawing hunger for a cigarette when I haven't smoked for a while.
R. I've found a cigarette in my mouth and didn't remember putting it there.

Other Reasons:
EXPECTATIONS OF CESSATION

I am going to read some statements made by people to describe what they would expect if they were to try to stop smoking. Please choose the number on the card which most closely represents your belief at this time. Make sure to rate every statement, according to how strongly you agree with it. 1 is for "strongly disagree" and 5 is for "strongly agree".

1. I could stop smoking anytime if I wanted.
2. I would gain weight if I quit smoking.
3. If I stopped smoking, I would probably start again within a few months.
4. I could stop smoking if my doctor were to tell me that I have to stop.
5. I could never stop smoking.
6. If I stopped smoking, I would only experience mild withdrawal symptoms.
7. I believe that I should wait until the "time is right" before I try to stop smoking.
8. If I stopped smoking, I would be irritable and tense most of the time.
9. I do not think that I could regularly perform certain activities (example: work, reading, drinking) without smoking.
10. I could stop smoking on my own (example: not attending a course, not quitting with a friend).
11. I would need something else to help me relax if I didn't have cigarettes.
12. If I were to stop smoking, it would mean that I have a lot of self-control.
13. If I didn't have cigarettes, I would need something else to give me a lift.
14. I would need a lot of luck in order to stop smoking successfully.

"Other expectations:"
REASONS FOR QUITTING SMOKING

I am going to read some statements made by people to describe why they stopped smoking. After each statement, please say "TRUE" or "FALSE" depending on your belief. When you choose "TRUE", I then will ask you to decide how influential this reason was in your decision to stop smoking. Please choose a number between 1 (not influential) and 3 (very influential). To begin with, just answer "TRUE" or "FALSE" to the statement.

1. My spouse or a close friend wanted me to quit smoking.
   TRUE OR FALSE?  
   How influential was that?

2. I knew someone who had stopped smoking.
   TRUE OR FALSE?  
   How influential was that?

3. My doctor advised me to stop smoking.

4. I had a particular health problem which meant that I should stop smoking (example: heart disease).

5. I was concerned about developing cancer or other health problems related to smoking.

6. Smoking was costing me too much money.

7. It was awkward to continue smoking because a lot of people don't smoke and there are restrictions on where you can smoke.

8. Cigarette smoke is harmful to others.

9. I think that parents should set a good example for their children by not smoking.

10. I think smoking can be harmful to children (example: affect pregnancy, affect child's safety).

Other reasons:
REASONS FOR NOT SMOKING

I am going to read some statements made by people to describe why they did not become regular smokers. After each statement, please say "TRUE" or "FALSE" depending on your belief. When you choose "TRUE", I then will ask you to decide how influential this reason was in your decision not to smoke. Please choose a number between 1 (not influential) and 3 (very influential). To begin with, just answer "TRUE" or "FALSE" to the statement.

1. When I was growing up (i.e., before age 18), most of my friends did not smoke.
   
   TRUE       or       FALSE?  
   
   How influential was that?

2. Cigarettes cost money on a regular basis.
   
   TRUE       or       FALSE?  
   
   How influential was that?

3. I had a specific health problem which meant that I should not smoke.

4. Smoking generally is bad for one's health.

5. At least one of my parents told me not to smoke.

6. At least one of my parents was a non-smoker when I was growing up.

7. Cigarette smoke is physically irritating to me.

8. Smoking is a dirty habit (e.g., smells, leaves butts).

9. I did not need something like cigarettes to help me relax or to keep me alert.

10. I had other ways to deal with stress and pressure than by smoking.

11. I never wanted to be part of a group of people who smoked.

12. My parents would have been upset if I had smoked regularly.

13. I thought that smoking was a "bad" thing to do.

14. I did not think that cigarettes would "do" anything for me (example: help me to work, relax).

Other Reasons:
ALCOHOL AND FOOD USE INVENTORY

I am going to read some statements made by people to describe their use of food and alcohol. Please choose the number on the card which most closely represents your belief at this time. Make sure to rate every statement according to how strongly you agree with it. "1" is for "strongly disagree" and "5" is for "strongly agree".

1. I usually am physically hungry when I eat something.
2. Part of the enjoyment of drinking alcohol for me is being with others who are drinking.
3. When I feel uncomfortable or upset about something, I like to have a drink.
4. I am very much aware of the fact when I am not eating.
5. I drink alcohol because I like the taste.
6. I have the habit of eating when I am bored.
7. I drink alcohol because it goes well with meals.
8. I want to eat when I am feeling "blue" or when worried about something.
9. I find that I sometimes eat without being aware of how much I actually am eating.
10. I drink to liven things up when they are dull and boring.

Times, if any, when overeat:

Times, if any, when drink too much:
Appendix 6  Tally Sheet  I.D.#

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SUMMARY

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171
I would like to take this opportunity to thank you again for your participation in the study on quality of life. As you recall, you completed a series of questionnaires concerning many aspects of your lifestyle and then were briefly interviewed by a research assistant. It now is possible to provide some feedback to you concerning the study.

There were several purposes to the investigation. One of the goals was to examine relationships between several lifestyle habits and quality of life variables; that is, the relationships between such things as cigarette and alcohol use, eating habits and exercise on the one hand and quality of life variables such as marital and family relationships, physical and material (financial) well-being, emotional health etc. Another purpose of the study was to look at how a particular situation can affect whether or not people will smoke. Some of you filled out your questionnaires in the presence of a research assistant who smoked. Others filled out their questionnaires in the presence of a research assistant who did not smoke. Also, sometimes ashtrays were available while at other times ashtrays were not available. Here the question of interest was whether smokers prefer to smoke in certain of these situations. Both men and women participated in the study and there was a mixture of smokers, non-smokers and ex-smokers.

Many variables were included in the study and it is not possible to list or discuss all of them. However I will briefly touch on some of the main results from different sections of the study. First, one's level of depression and anxiety were consistently related to the quality of many aspects of one's life. For example, people who were more depressed and anxious tended to report less favourable marital and personal relationships, less favourable physical and financial states and also were less active in sports, creative and recreational activities. Furthermore people who seemed more depressed than others also were more anxious. This means that feeling depressed seemed to go hand in hand with feeling worried or nervous about things and viewing most areas of one's life relatively unfavourably.
Quality of life also was related to specific lifestyle habits. The frequency of excessive drinking increased among those reporting lower satisfaction with their marital or personal relationships. Likewise, cigarette smoking, "binge eating" and eating "junk food" were more prevalent among those reporting lower satisfaction on many quality of life variables (e.g., physical and material well-being, creative and recreational life). There were a few differences between men and women with respect to quality of life. Men tended to report their financial/material situation and their self-confidence more favourably than women. In contrast, women reported that they had better relationships outside of the home than men although women generally were anxious than men. Finally, women said that they smoked cigarettes when angry or upset about something to a greater extent than men even though there was no difference in the number of cigarettes that men and women smoke each day. Finally, both male and female smokers smoked more cigarettes when they were in the company of a smoker than when they were in the company of a nonsmoker.

In summary, such general lifestyle habits as cigarette smoking, excessive drinking poor eating habits seem related to satisfaction with many aspects of one's life and one's emotional health. However, indulging in any of these lifestyle habits on a particular occasion, of course, can be influenced by other factors as well. As we have seen, smokers can be influenced at least in part by whether or not someone else in their presence is smoking.

Results from this study will be beneficial to the understanding of lifestyle habits and to programs geared to quality of life. Thank you again for your assistance.

Sincerely,

Patricia Bolla

Patricia Bolla (Project Supervisor)
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University of Western Ontario
London, Ontario
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