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SMOKING BEHAVIOR OF PREGNANT WOMEN:
THE ROLE OF SELF EFFICACY, PARTNER SUPPORT AND MATERNAL ADAPTATION
by

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DISSERTATION

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**SMOKING BEHAVIOR OF PREGNANT WOMEN:
THE ROLE OF SELF EFFICACY, PARTNER SUPPORT,
AND MATERNAL ADAPTATION**

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CONTENTS

	<u>page</u>
ABSTRACT	1
INTRODUCTION	2
Clinical Significance	4
Medical Implications	6
Prevalence	10
Intervention Efforts	12
Conclusions	15
Behavioral Theory of Smoking	18
Social Learning Theory	20
Empirical Support	22
A. Facilitators of change	22
B. Determinants of relapse	30
Psychodynamics of Pregnancy	32
Psychoanalytic Contributions	33
Empirical Support	35
A. Maternal adaptation	35
B. Prenatal stress and anxiety	41
Integration	44
HYPOTHESES	47
Primary Hypotheses	47
Secondary Hypotheses	48
Exploratory Hypotheses	49
METHODS	50
Subjects	50
Procedure	50
Materials	52
Study Entry	52
Third Trimester Follow-up	56
Data Analysis Plan	57
RESULTS	58
Sample Characteristics	58
Pregnancy History	58

Smoking Characteristics	59
Follow-up Sample	60
Objective Verification Results	60
Inter-rater Reliability	61
Data Reduction	62
Covariate selection	62
Independent variable selection	64
A. Self efficacy	64
B. Maternal adaptation	64
Hypothesis Testing Overview	66
Hypothesis 1	68
Hypothesis 2	71
Hypothesis 3	72
Secondary Hypotheses	73
Secondary Hypothesis 1	73
Secondary Hypothesis 2	74
Secondary Hypothesis 3	76
Secondary Hypothesis 4	76
Secondary Hypothesis 5	77
Secondary Hypothesis 6	78
Secondary Hypothesis 7	79
Exploratory Hypotheses	81
Descriptive Findings	83
DISCUSSION	84
Self Efficacy	85
Partner Support	87
Maternal Adaptation	89
Health Risk and Personal Susceptibility	92
Recommendations for a Next Step	96
Concluding Remarks	101
REFERENCES	102
APPENDICES	112

ABSTRACT

This research was designed to identify the distinguishing psychological characteristics of women who are successful in quitting smoking versus those who continue to smoke during pregnancy. Subjects were 78 women of mixed parity who described themselves as smokers prior to pregnancy confirmation. Key variables assessed in the first trimester were self efficacy, partner support, and maternal adaptation. Information pertaining to smoking history and pregnancy experience was also measured. Follow-up data obtained in the third trimester consisted of smoking status, and a retrospective report of partner support and stress experienced over the course of gestation. Results indicated that women quitting in the early stages of pregnancy remained abstinent throughout gestation. In contrast, those who were still smoking in the first trimester (study entry), showed considerable variation in tobacco use. Characteristics of early quitters included high levels of self efficacy and perceived susceptibility. Of smokers at study entry, women able to reduce over the course of pregnancy reported having more partner support and a greater number of coping skills to avoid smoking than smokers not capable of reduction. Findings were discussed in view of developing an effective treatment intervention that would appeal to pregnant women and would promote reduction and/or abstinence during pregnancy.

INTRODUCTION

Cigarette smokers give many reasons as to why they use tobacco. These include comments such as "I like the taste", "It picks me up, gives me energy", "It relaxes my nerves and helps me combat feeling stressed", or "I'm addicted, I don't feel as if I have a choice." Over 53 million American adults smoke cigarettes. This figure appears alarmingly high in light of the staggering list of health risks now firmly associated with tobacco smoke. Attitudes, however, are slowly changing as are smoking patterns. A recent Surgeon General's Report(U.S. DHEW, 1979) found a significant decrease in prevalence of smoking among middle-aged men. In fact, the number of males in this age group that smoke is at the lowest recorded level in 45 years. A second encouraging trend is the number of smokers interested in quitting. One out of three smokers makes a serious attempt to quit each year(U.S. DHEW, 1979).

Tobacco manufacturers have not overlooked these changing statistics. A concerted effort has been made to maintain or if possible, expand their market share of tobacco sales. Over \$500,000,000.00 was spent on advertising in 1980 by U.S. tobacco companies(Neuber & Rizio, 1982). This huge expenditure put Philip Morris, Inc. in fourth position and R.J. Reynolds in seventh on the list of the top 100 national advertisers in 1980(Advertising Age, 1981). Much of this tobacco advertising, over 200 pages in fact, appeared in women's magazines(Frumkes, 1980).

Historically, females represented a very small segment of the smoking population. To increase consumption among this group, particular advertising plays were purposely designed to appeal to the young teenage and female market. Advertisements featuring themes of independence, assertiveness, liberation, and status have dominated the recent marketing strategy of tobacco companies (Raven, Note 1). Moreover, attractive slender models are routinely selected to reinforce the image appeal of tobacco, and serve as a subtle prompt to use cigarettes as a substitute for food and sweets.

This focused advertising has brought returns to its investors as evidenced by changes in smoking behavior of targeted groups. Young women are now initiating smoking at a higher rate than their male peers, a trend not seen before (Evans, Henderson, Hill & Raines, 1979; U.S.DHEW, 1980). In addition, more female smokers are increasing their habit to over a pack a day than in 1978. At the other end of the spectrum, it may be relatively more difficult for female than male smokers to quit either on their own (Schuman, 1977), or through organized programs (Delahunt & Curran, 1976; Flaxman, 1978; Walker & Franzini, 1983; West, Graham, Swanson & Wilkinson, 1977).

Interestingly, it has been determined that female smokers view themselves as significantly less vulnerable to the carcinogenic properties of tobacco smoke than males (Tagliacozzo, & Vaughn, 1980). As a result some women may be smoking without fully realizing their susceptibility to the long term consequences of tobacco use. The deceptively greater impact of smoking on males will change as more women begin to smoke at a younger age and match in duration the smoking history of males. Such a catch-up trend has emerged in the most recent cancer mortality figures where for the first time, cancer mortality rates in women were highest for cancer of the lung (U.S. DHEW, 1980).

In summary, these findings indicate that tobacco smoking among females represents a serious and growing health threat. Moreover, this particular group of smokers may require specialized intervention efforts to overcome the influence of tobacco advertisers and peer groups. The significance of treating this group, however, is amplified when a female smoker becomes pregnant. Health risks once confined to her are now shared with the fetus she carries. It is this particular group of smokers that comprises the focus of the dissertation research that follows.

Clinical Significance

The list of potential obstetrical complications linked to maternal smoking is lengthy and still expanding. Before covering in more detail some of physiological outcomes, it is first important to provide a historical perspective to this relatively new prenatal risk.

Evidence attesting to the myriad of health dangers produced in pregnancy by smoking is now readily available, although it was not as easily obtained 10 to 15 years ago. The changing demographic patterns in female smoking accounts for much of the delay in clarifying the fetal effects of tobacco use. Women as a group, did not engage in heavy or consistent tobacco use until after WW II. Because of their slower adoption of smoking, there were fewer women to constitute adequate samples for controlled studies. Early correlational evidence from the 1950's linking low birth weight to maternal smoking was criticized on methodological grounds for not controlling for differences between clinic and private patients.

Editorial opinion representative of the practitioners' point of view continued to question the validity of the research on fetal effects from tobacco use as late as 1973. One such article appearing in *Nature*(1973) commented, "Pregnancy is a time of heightened emotion, change in lifestyle (often including loss of earnings), and well meaning advice. Mothers-to-be have always been under pressure to avoid excessive weight gains and this pressure, it is well known, frequently causes distress. Cigarettes often keep both weight and nerves under control- it is quite possible that advice to stop smoking may have exactly the wrong effect on the mother's total health."

As empirical support accumulated, England's Council of Health Education responded by adopting maternal smoking as its key health risk of 1975. Extensive media effort was devoted to educating the public regarding the fetal damage associated with tobacco use. U.K. health providers also undertook clinical interventions aimed at modifying smoking among their pregnant patients(Baric, MacArthur & Sherwood, 1976; Donovan, 1977). Attitudes of American physicians followed this change in perspective in the late seventies. Little, Pytkowicz-Streissguth, Guzinski, Grathwohl, Blumhagen and McIntyre (1983) reported that 68% of Seattle obstetricians in 1979 addressed the subject of tobacco use at the first prenatal visit with the patient. After a two year community education program focusing on alcohol and drug use, this figure rose to 94% among Seattle physicians.

Prenatal care now includes routine suggestions that women quit all together if possible, or limit their consumption to 10 cigarettes a day. In support of this current view, 1983 medical editorials emphasize the consistency of research findings that link tobacco use during pregnancy with poorer obstetrical outcomes. As

stated recently in an American Journal of Public Health editorial(1983), " the association between cigarette smoking and intrauterine growth, over time, through the social classes, over age groups, ethnic groups, and geographic location remains firm and stable".

As the number of female smokers grew, it became feasible to evaluate the immediate effects of tobacco use on mother and fetus during pregnancy as well as any delayed impact on infant development. The resulting list of medical complications derived from this empirical work supports tobacco related problems throughout gestation as well as following delivery. Complications positively associated with maternal smoking include a greater likelihood of spontaneous abortion (i.e., miscarriage), maternal hemorrhage, placenta praevia, fetal hypoxia, low fetal birth weight, premature rupture of membranes, preterm labor, congenital malformations, sudden infant death syndrome, childhood learning disabilities, and a higher incidence of childhood hospitalization. The range and severity of these hazardous outcomes underscores the need to inform women as well as to encourage them to modify their smoking during pregnancy. A fuller description of these complications and the strength of their association with obstetrical outcome is given in the next section.

Medical Implications

Tobacco smoke contains more than 2000 compounds; the most deleterious to one's health include nicotine, carbon monoxide, and polycyclic aromatic hydrocarbons(Longo, 1977). All of these cross the placental barrier and are believed to decrease the oxygen-carrying capacity of the red blood cells, as well as reduce the pressure at which oxygen is delivered. Although the mechanism that produces

tobacco-associated complications is not completely understood, it is the restricted oxygen flow that is postulated to decrease the weight of the fetus.

Low fetal birth weight is the most prevalent outcome found in infants born to smoking mothers. Simpson is credited with being the first to observe this association in 1957. Since then it has been replicated in many studies involving more than half a million births. By depriving the fetus of valued oxygen, intrauterine growth is retarded producing a fetus that weighs on average 200 grams less than babies born to nonsmokers. Combined results from five studies indicated that smokers had twice as many low birth weight babies as nonsmokers(U.S.DHEW, 1980). Viewed from a slightly different perspective, 21 to 39% of low birth weight was attributed to maternal smoking. Apparently the greater the number of cigarettes consumed by the woman, the smaller the infant(Schwartz, Goujard, Kaminski, Rumeau-Rouquette,1972). This is particularly true in the case of heavy smoking during the second half of gestation when fetal growth is most accelerated. Although many women are unaware of the health risks associated with a lighter baby, the consequences are serious nonetheless.

Low birth weight infants are more susceptible to illness, and to death than infants who are of normal birth weight. Martin(1982) reported a 20% greater neonatal death rate in infants born to women who smoked less than a pack a day than for infants born to nonsmokers. If women smoked in excess of a pack, this increased mortality rate rose to 35%. The Surgeon General's Report(U.S.DHEW, 1980) comments that perinatal mortality among smokers is influenced by other factors such as socioeconomic status, parity, level of education, and ethnicity. For example, infants born to mothers who smoke, are black, come from a lower SES class, and have had multiple births are at higher risk than infants who are

exposed only to maternal smoking. Meyer, Tonasicica and Buck (1975) found an increased mortality risk of 70 to 100% in mothers characterized as clinic, high parity patients who had previously experienced low weight births or anemia. Mortality relative risk ratios for smoker versus nonsmoker range from a low of 1.01 to a high of 2.42 depending on study samples.

Sudden infant death syndrome (SIDS) usually occurring several weeks to two years after birth has also been consistently associated with maternal smoking. In a large study including 19,047 births from the Kaiser Health plan, it was found that 70.6% of the mothers with SIDS babies smoked during pregnancy compared with only 35.3% of mothers whose babies did not die from SIDS ($p < .001$). In this sample the relative risk for smokers compared to nonsmokers was 4.4 (Lewak, Van den Berg, & Beckwith, 1979). In a second study examining 56 families with SIDS infants and 86 controls, Bergman and Wiesner (1976) reported that 61% of the SIDS mothers smoked during pregnancy compared to 42% of the controls. However, these percentages of smoking behavior remained essentially unchanged once the infant was born. The authors point out that it is unclear whether exposure in utero enhanced the risk of SIDS or if passive smoke exposure following delivery was more important. This remains to be clarified as does the role of paternal smoking during both pre and postnatal periods.

Another complication that differs between children exposed to tobacco in utero and those born to nonsmokers is later learning difficulties. Davie, Butler and Goldstein (1972) found significant learning delays of 3 to 5 months in 11 year olds born to smokers who consumed 10 or more cigarettes per day while pregnant. Even when biological and social variables were controlled, chi square analyses indicating likelihood of association were highly significant ($p < .001$). Other studies

have failed to produce as dramatic findings, though trends in the results favored offspring of nonsmoking rather than smoking mothers (Dunn, McBurney, Ingram & Hunter, 1976; Hardy & Mellits, 1972). As in the case with SIDS, it is difficult to untangle the effects of tobacco exposure in utero from passive smoke inhalation during childhood development.

Statistics comparing nonsmoking and smoking women are also striking for the incidence of complications that expel the fetus prematurely. Several studies have found a statistically significant relationship between maternal smoking and spontaneous abortion (Hollingsworth, Moser, Carlson & Thompson, 1976; O'Lane, 1978). Longo (1977) reported a 30 to 70% greater incidence of spontaneous abortions in smokers than in nonsmoker cohorts across a variety of clinic patients. In a prospective study, Kullader and Kallen(1971) found that spontaneous abortion rate among smokers was higher in the case of unwanted than wanted pregnancies (relative risks of 1.35 and 1.20). Preterm birth occurring between the gestational age of 22 to 37 weeks is also more often seen in women who smoke during pregnancy than in nonsmokers. The Surgeon General's Report (U.S. DHEW, 1980) directly attributed 14% of all preterm births to maternal smoking. Preterm delivery can be especially devastating to an infant who is also suffering from fetal hypoxia and a smaller birth weight. Finally, recent clinical studies have found a relationship between maternal smoking and congenital malformations(Himmelberger, Brown & Cohen, 1978). This represents the newest complication associated with maternal smoking, and as such will require replication.

Prevalence

The prevalence rate of tobacco use among pregnant women has been the topic of several epidemiological investigations. Despite the list of potential medical complications, estimates of the percentage of pregnant patients who smoke range from 22% in Seattle (Pytkowicz-Streissguth, Darby, Barr, Smith & Martin, 1983), to 47% in North Carolina (Bauman, Bryan, Dent & Koch, 1983). Rates in between these extremes have also been reported (e.g., 28% Wilner, Palmer, Schoenbaum & Monson, 1981; 31% Fried, Watinson, Grant & Knight, 1980; & Reading, Campbell, Cox & Sledmere, 1982; 40% Carodozo & Cooper 1982, and 45% Hughes, Epstein, Andrasik, Neff & Thompson, 1982), with higher figures in tobacco growing regions.

These figures may overestimate the rate of smoking since many are based on clinic populations comprised of middle and lower class patients. More importantly however, these estimates above the national average for female smokers (i.e., 29.8% The Nation's Health, 1984) reflect the skewed age distribution of tobacco use. To wit, women of childbearing age are more likely to smoke than women over forty. The demographic trends of both female and male smokers follow this shape of distribution with the majority of serious quit attempts occurring in the 45+ age group(U.S. DHEW, 1979).

In addition to studying prevalence rates, epidemiologists have documented modification in tobacco use among pregnant women. These changes have been investigated both across cohorts (between subjects), as well as within groups where smoking rates were assessed prior to conception as well as late in pregnancy. Over a six year period (1975 to 1981), Pytkowicz-Streissguth(1982) reported a 3 % drop in tobacco use among two predominantly white, middle class, obstetric

cohorts in Seattle. Although this is not a dramatic shift, initial smoking rates in Seattle were much lower than other urban samples studied. Several studies have examined within-sample changes occurring in the absence of intervention efforts. Percentages of self quitters include estimates of 11% (Hughes et al., 1982), 12 to 13% (Martin, 1982), and higher figures of 25 to 33%(Fried et al., 1980; Wilner et al., 1981). It is difficult to account for the variability between these studies, especially since no formal treatment programs had been offered. The most likely reasons would include geographical or socioeconomic differences in sampling.

Despite the differences in quit rates, these studies did report a number of similar characteristics describing quitters and continued smokers. For example, continued smokers were found more often to 1) have a lower family income (Fried et al., 1980; Taylor, 1980), 2) to be single (Cardozo & Cooper, 1982; Wilner et al., 1981), 3) to delay in seeking prenatal care (Cardozo & Copper, 1982), 4) to have less education (Fried et al., 1980), and 5) to be least inclined to see smoking as a serious health threat to their embryo or fetus(Graham, 1976; Taylor, 1980). This is not to say that many of these women lacked information regarding the deleterious effects associated with maternal smoking. Rather, continued smokers were less convinced of their personal susceptibility to its consequences. Self quitters, on the other hand, were better educated (Fried et al., 1980; Wilner et al., 1981), reported more nausea in the early stages of pregnancy, and were lighter smokers prior to conception(Cardozo & Cooper, 1982).

Intervention Efforts

Attention has been brought to facilitating the process of smoking cessation in pregnant women. Interest in this issue has been shared by public health educators, physicians, nurses, and psychologists. Previous intervention attempts have been derived from two theoretical paradigms: the knowledge, attitude, practice (KAP) model found in health education, and the psychological theory of behavior modification predicated on learning principles. Studies based on these two approaches will be reviewed below.

The major premise underlying the KAP model is that individuals lack the knowledge regarding the outcome of their present actions. It is presumed that if the right information presented in a convincing way is given to a person, he or she will alter cognitive attitudes as well as risk behaviors. The primary outcome of this perspective in intervention work has been to provide patients with educational material explaining long term consequences.

Baric recruited 110 pregnant smokers and 24 ex-smokers who had quit upon pregnancy confirmation for participation in a randomized study (Baric et al., 1976). He and his colleagues were concerned with testing the effectiveness of an intensive educational interview by a medical provider on altering smoking behavior. This interview consisted of explaining the harmful effects of smoking on the embryo and fetus, obtaining a commitment to stop smoking or drastically reduce, and providing a smoking diary to log time and number of cigarettes smoked. Behavior change in a control group receiving routine prenatal care was compared with intervention subjects. When subjects were recontacted 11 weeks later, 60% of the treatment group reported positive changes in their smoking behavior compared to only 15% in the control group. The women most receptive to the physi-

cian advice were of higher class, better educated, had quit before for at least six months, and had read about the dangers of smoking prior to the interview (these characteristics were also true for the ex-smokers). The authors concluded that the provider interview acted more as a catalyst to change since it was most effective in patients previously interested in the effects of tobacco during pregnancy.

In a similar study, Donovan (1977) randomized 280 pregnant smokers to an intervention and 308 smokers to a control group. Following a one-shot intensive interview in which anti-smoking information was delivered, clinic staff were asked to reinforce this message at subsequent visits of "treated" patients. A comparison of the obstetrical outcomes between the two groups revealed no statistical differences in fetal weight, infant maturity, placental weight and incidence of fetal distress. Donovan was similarly circumspect in regards to his study conclusions. He commented that "the number of women who change their smoking during pregnancy is small if there is no pressure upon them to do so and even with such intervention the proportion who change is not large."

Health educators have used a second strategy to modify maternal smoking habits. This approach has entailed giving the patient concrete, physiological feedback to amplify the consequences of a risk behavior. Technologies such as the fetal sonogram that allows viewing the fetus in utero, and the Ecolyzer, an instrument that measures electrochemical levels of carbon monoxide in expired air have been employed in two such recent studies.

Reading et al. (1983) assessed a variety of health habits (including smoking) by self report in 129 pregnant patients undergoing random assignment to a high or low feedback ultrasound group. Women in the high feedback condition were al-

lowed to see the monitor screen and were shown the fetal size, shape and movement. In the low feedback group, the screen was not visible and no specific verbal information was given. It was hypothesized that women would become more motivated to improve their health habits during pregnancy if given the chance to view the developing fetus. Smoking rates measured at a later posttreatment date, however, revealed no statistical differences in subjects who initially reported themselves as smokers($n=40$).

Similar discouraging results were found by Bauman et al., (1983) who divided 170 prenatal patients into two groups, both of which received a carbon monoxide reading by an Ecolyzer. Smokers and nonsmokers were tested together so that the negative effect of smoking on pulmonary function could be seen by all group members. In addition to receiving CO feedback, the treatment group was read a short script describing the effects of smoking during pregnancy. Six weeks later all subjects were retested on the Ecolyzer and completed a one page health questionnaire. There was no statistical difference in group assignment on the outcome measure of post-test CO level. However, when this variable was entered in analyses as a continuous rather than dichotomous outcome and was examined with 12 covariates, a $p<.04$ effect was detected.

The authors were cautious in their conclusions stating that the effect, if truly present at all, was minimal. Afterall, significance was found when outcome was conceptualized in only one fashion. Secondly, the latter analysis had 12 variables entered as covariates before group assignment was tested. They suggested that future studies should be done with private patients who presumably would be more likely to change. More importantly, they urged that future feedback studies be combined with an explicit plan for smoking modification.

The suggestion of a treatment plan including several exposures to a therapist or change agent has received preliminary attention from psychologists interested in learning principles. Danaher et al. (1978) offered a seven week smoking cessation group to pregnant smokers. This program consisted of health education, relaxation training, aversive smoking, and coping skills designed to foster continued abstinence. Although this comprehensive package appeared promising, study results were considered exploratory because of sample size constraints. Of 11 women initially enrolled, two subjects dropped out prematurely, and a third had a miscarriage. At the end of treatment, almost all subjects reported a decline in their smoking. However, at nine months posttreatment half of the women had returned to their initial level and only three reported complete abstinence.

The authors believed that their exploratory findings provided some support for the effectiveness of a behaviorally based cessation program. They also pointed out the shortcomings of the research including small sample, omission of a control group, and a probable volunteer effect.

Conclusions

Immediately apparent in reviewing the literature on interventions to help pregnant women quit smoking is the limited number of studies. Most certainly this is due to the relatively recent status of maternal smoking as a serious health threat. It also suggests, however, that our understanding behind the dynamics of this particular risk behavior is still somewhat primitive. The present literature provides certain clues about this behavior as well as reveals methodological difficulties that need to be addressed in future studies. For example, based on the work of health educators, it becomes clear that education on fetal effects is most

beneficial in affecting change in well educated and highly motivated obstetric patients. For the majority of the pregnant population, education alone, be it in the form of verbal information or physiological feedback, is not sufficient to produce significant change in tobacco use. Both Baric et al.,(1976) and Bauman et al.,(1983) concluded that an adjunct program focusing on cessation coping skills and relaxation training would have improved their results considerably. Without this, intervention effects were minimal and not sustained.

A second lesson learned from these previous studies is the problem of a high drop-out rate. Danaher et al.(1978) saw this as a shortcoming to their intervention which made statistical testing infeasible. Other researchers have discussed the problem of low initial turnout for smoking programs among pregnant patients. This has been the case even when such programs were offered without charge and were easily accessible. Hughes et al.,(1981) reported that despite an earlier stated interest in stopping, no pregnant smokers turned out for a cessation program subsequently offered. In a preliminary report, Taylor(1983) also found few women willing to participate in his cessation intervention. Unfortunately, this was particularly true for women with the heaviest smoking histories.

A third issue that merits attention is the validity of self report data that have often served as the basis for program evaluation. Previous smoking intervention studies have been criticized for their lack of an objective measure to verify self reported smoking status. Self reports are subject to bias and may underestimate true occurrence of smoking. Verification methods such as a physiological assay of cotinine or a monitor in frequent contact with the subject (e.g., co-worker or spouse) can be used to substantiate self reported cigarette use. With the exception of Bauman et al.(1983), objective verification of smoking was

not undertaken in any of the earlier interventions. This drawback further limits the generalizability of study results since the validity of smoking status as an outcome measure is suspect.

In summary, recent efforts aimed at modifying cigarette use during pregnancy have produced only limited success. It may be that we have not conceptualized the pertinent issues of this health risk in an appropriate manner. Further, it could be argued that before offering another cessation package to the pregnant smoker (who may or may not attend), it would be prudent to undertake additional groundwork. For example, research attempting to clarify the particular barriers to quitting for the pregnant smoker, the psychological assets or coping resources of the successful quitter, and equally important, the relationship between these smoking variables and a woman's psychological adaptation to her pregnancy needs special attention. It is important to investigate if there are unique stresses during the period of pregnancy that make it particularly difficult for some women to abstain or reduce. Psychological tasks such as reconciliation with one's mothering experience, or accepting and incorporating the fetus as part of a new identity represent concerns that may also occupy a female smoker during pregnancy. The purpose of this dissertation is to explore these questions by concatenating two theoretical literatures: the behavioral paradigm of social learning theory as it specifically relates to modifying tobacco use, and the psychodynamics of pregnancy with an emphasis on maternal adaptation.

It is believed that by developing hypotheses from these two distinct models that a clearer understanding of the unique problems faced by the pregnant smoker will emerge. An overview of these separate literatures will be presented in the next two sections, followed by an integration and statement of study hypotheses.

Behavioral Theory of Smoking

The behavior of smoking has been extensively studied by psychologists interested in primary prevention, smoking cessation, and maintaining nonsmoking in quitters. In fact, compilation of research in this area has comprised over 20 review articles (e.g., Bernstein & McAlister, 1976; Evans, et al., 1979; Leventhal & Cleary, 1983; Lichtenstein, 1982; Lichtenstein & Danaher, 1976). The ontogeny of smoking as alluded to above is seen as a complex process that entails several stages of adoption, maintenance, as well as decision making regarding quitting. As described by Leventhal and Cleary (1982), an individual's natural history of smoking can be divided into 1) preparation 2) initiation, 3) becoming a consistent smoker, 4) maintaining the habit, 5) dissatisfaction with the behavior, 6) decision to quit, 7) adoption of self image as ex-smoker, and finally, 8) abstaining from smoking. The interest of this dissertation focuses on stages four to six where a female smoker once pregnant proceeds to either continue using tobacco, modifies her smoking (e.g., increases or decreases) or gives it up all together if only for the duration of gestation. Since smoking during a nine month period can go through several changes including initial quitting and subsequent relapse, this review will also touch on the topic of recidivism.

Initially, psychologists viewed smoking as an overlearned behavior that was amenable to change via the laws of conditioning. Afterall, smoking represents an often occurring, specific and concrete behavior that is relatively easy to measure and, one that many people want to eliminate (Lichtenstein, 1982). Pechacek and Danaher (1979) defined smoking as a consummatory behavioral excess that is maintained by both negative and positive reinforcement contingencies. The immediate response to smoking described by many is one of pleasure (i.e., positive),

while inhaling also serves to eliminate the body's craving for nicotine (i.e., negative reinforcement). By practicing this behavior in a wide range of situations, the smoker acquires a large set of discriminating stimuli that serve as prompts or cues to light up again. It has been estimated that a person who consumes a pack of cigarettes each day inhales approximately 4000 times a month. Given this high rate of response it is not surprising that brief interventions have been only marginally successful in producing abstinence.

When viewed from a short term perspective, it has been well established that behavioral cessation interventions are effective(e.g., Best, Owen, & Trentadue, 1978; Delahunt & Curran, 1976; Hackett & Horan, 1979; Hall, Rugg, Tunstall, & Jones, Note 2; Lando, 1977; Resnick, 1968). Most of the successful programs have included an aversive or rapid smoking component in their treatment, used a group format, and have employed self monitoring techniques such as daily record keeping. One assumption underlying the behavioral paradigm is that smoking, considered an overlearned behavior, should be subject to modification using the principles of learning theory(e.g., reinforcement, stimulus control,etc.). Despite initial cessation figures that some have claimed to run as high as 100%, long term maintenance rates of nonsmoking are less impressive. In his review, Danaher(1977) found an average six month quit of 30% across seven well controlled studies using aversion. This figure continues to be replicated in many of the state of the art intervention programs, and has prompted some researchers to develop more elaborate theoretical models of risk taking. In fact, many heuristic models now under consideration in smoking research are much more complicated seeking to combine elements of the social environment with psychopharmacological factors. Some of these models, for instance, consider nicotine addiction, affective

states, and self regulation of beta endorphines as possible contributors to the resistant problem of tobacco use (Jarvick, 1977; Pomerleau, 1979, Note 3; Russel, 1976; Schachter, 1978).

Social Learning Theory

One theory that recognizes the complexity of human behavior and has provided a heuristic framework for understanding health risk behavior is Bandura's (1977a) Social Learning Theory. In contrast to the original restricted use of learning theory, Bandura's paradigm presents a comprehensive approach to human functioning (both prosocial and deviant) by emphasizing three regulatory systems. These include: 1) behaviors acquired primarily under the control of external stimulus events through classical conditioning, 2) response patterns developed and maintained under the influence of external reinforcement, i.e., operant conditioning, and most importantly, 3) information acquired and symbolically encoded by cognitive/mediational processes. Because Bandura recognized all of these systems as important determinants of human behavior, the emphasis of SLT has been described as falling somewhere between organismic Piagetian psychology and conditioning/operant psychology learning.

SLT offers several specific advantages to developing therapeutic interventions over strict behavioral laws of learning. First, by its recognition of a cognitive-mediational system, Bandura gives credence to the individual's capacity to not only symbolically process information, but to also learn from it. This is important in understanding acquisition since it helps to illuminate why people are capable of initiating behaviors, and why we can learn from observing others' behavior without having to engage in our own trial and error testing.

A second advantage to SLT is that it recognizes the importance of internal cues and physiological feedback in modulating performance. This principle speaks to individual differences in affective states and the influence of these on performance. Earlier behavioral theories did not address discrepancies in individual performance nor did they recognize internally generated cues that provided feedback to the subject.

Finally, a third distinguishing contribution of SLT is Bandura's construct of reciprocal determinism. Bandura addresses the interplay between the environment and actor where each influence the other, hence reciprocal determinism. An important therapeutic implication to this is viewing each person as the primary agent in self-directed change. The role of self attribution in promoting the change process has recently received empirical support in smoking interventions. It was found that smokers who viewed themselves as responsible for their success at quitting were likely to remain abstinent for longer periods of time than those who saw their therapist or treatment program as responsible (Colletti & Kopel, 1979; Shipley, 1981).

SLT has targeted two variables particularly germane to clarifying the process of altering risk behavior. These are self efficacy, an internalized sense of personal mastery, and social support, an environmental source of information that affects behavior change both directly (input such as verbal reinforcement), and indirectly (modeling of the desired behavior).

Efficacy expectations, a key construct in SLT are "the conviction that one can cope successfully with a given situation(Bandura, 1977b)". They will determine whether coping behavior is initiated, with what effort, and how resolute one is in continuing to cope in the face of inevitable pressures and problems encountered

in controlling a problem behavior. These expectations are derived from four sources of information including: 1) previous performance accomplishments, 2) vicarious experiences observed in others, 3) verbal persuasion, and 4) physiological feedback in the form of anxiety, discomfort, or composure. Bandura believed that different treatment approaches provided varying levels of success in altering one's efficacy expectations. For instance, greater changes in efficacy/coping responses could be anticipated in treatment programs providing dependable information or feedback. Interventions that allow the subject to observe (modeling) or to actually perform the new behavior would be superior to programs relying on verbal persuasion (e.g., psychotherapy).

Empirical Support

A. Facilitators of change.

Modifying cigarette smoking has been the topic of several empirical studies particularly interested in the impact of efficacy on treatment outcome. Conditte and Lichtenstein (1981) developed an efficacy scale for smokers that measured the magnitude, generality and strength of resisting the urge to smoke in 48 high-risk situations. Efficacy expectations were assessed in two programs (a university-based quit program and the Five Day Plan sponsored by the Seventh Day Adventists), at the beginning and end of treatment, and at a three month follow-up. In addition, university-clinic subjects (n=35) were asked to complete a mid treatment efficacy scale to allow for examination of change over the course of treatment.

Both treatment programs were found to produce a significant improvement in coping/efficacy expectations between pre and post tests ($p<.001$). In fact, mid treatment scores indicated that this growth in coping occurred in a linear fashion over the course of treatment. A multiple regression using seven clusters of efficacy expectations derived from high-risk items (e.g., feeling anxious, drinking alcohol, feeling bored, etc.) were entered as predictor variables. In this analysis, length of time remaining abstinent was used as the dependent measure. An association between higher levels of post-treatment efficacy and a greater probability of long term abstinence was found ($R^2=38\%$).

Finally, subjects who relapsed were queried by phone interview about the circumstances under which they smoked. Responses were then coded into several categories by interviewers blind to the subject's efficacy score. Based on a reliability measure of Kappa, an extremely high correspondence was found between an individual's efficacy cluster score and the situation in which she or he relapsed ($K=.89$). This finding suggests a specific clinical utility to measuring self efficacy in that high risk situations may deserve special attention during treatment interventions.

Walker and Franzini (Note 4) tested the relationship of self efficacy, and locus of control to treatment outcome in 64 subjects. Smokers randomly assigned to one of two behavioral cessation treatments (taste satiation versus focused smoking), were compared on efficacy levels with end of treatment, one month, three month, and six month abstinence rates. In addition to replicating the effect of an increase in self efficacy between pre and posttreatment assessment, Walker and Franzini report that the efficacy change score was the strongest predictor ($p<.01$) of six month abstinence in a discriminant analysis. The Multiple

Health Locus of Control did not prove to be a statistically significant factor in the discriminant analysis. It did account for 3% of the variance predicting third month follow-up ($p < .01$). The authors concurred with Condiotte and Lichtenstein's recommendation to tailor future programs to situations found personally challenging to smokers after receiving informal feedback from participants in support of this approach.

Another empirical test of the relationship of efficacy expectations to maintaining nonsmoking was done by DiClemente(1981). Sixty-three volunteers who had quit either through behavioral programs or on their own were assessed with a shorter 12 item scale that focused on situations with strong cues to smoke. Subjects were asked to rate the degree of certainty that they could avoid smoking in a given situation. About five months later, subjects were recontacted by phone for follow-up assessment of current smoking behavior. There were no significant differences in quit rates or self efficacy scores between behavioral intervention participants and self-initiated quitters. At five months, two thirds of all subjects were abstinent. These people had significantly higher efficacy scores than recidivists($p < .005$).

Finally, Brod and Hall(in press) compared three measures of Bandura's self efficacy on the basis of their respective ability to differentiate treatment joiners from nonjoiners; and of those who did participate, successful quitters from failures. In addition to using Condiotte and Lichtenstein's Confidence questionnaire, they developed two new measures of self efficacy that tapped the more global determinants of these expectations. The authors criticized earlier situation-specific measures for too narrowly defining one's sense of mastery. In addition to information derived from past performance, Brod and Hall's Self Efficacy Assess-

ment Scale measured modeling influences (i.e., how many people do you know who have tried to quit, how successful have they been, how similar to the successful people are you?), and physiological/affective states (e.g., how tense or uncomfortable do you feel when you think about quitting?). A second measure of efficacy, The Quality Possession Scale, required the subject to generate three important attributes necessary to quit smoking. They were then asked to rank order these qualities and to indicate the degree to which they possessed these traits.

A series of univariate logistic regressions were performed to test the association between efficacy scales and outcomes of joiner versus nonjoiner, and treatment success versus failure. The Self Efficacy Assessment scale significantly differentiated end of treatment status, as well as six month follow-up reports. On the other hand, The Quality Possession Scale discriminated treatment joiners from people deciding not to enroll in the program. Although Condiotte and Lichtenstein's scale did not account for a significant portion of variance in either of the above analyses, an analysis of covariance revealed a significant pre to post-treatment increase in expectations for quitters ($p < .001$).

In their discussion, Brod and Hall explain these results on the basis of the requirements of each task. For example, efficacy expectations initially important in making the decision to join treatment may be different from the efficacy expectations attached to treatment progress or success. Further, continued maintenance of nonsmoking may be heavily influenced by one's social environment where greater exposure to smokers (e.g., family members) could weaken one's confidence in coping.

In conclusion, Bandura's contribution of personal efficacy expectations has been beneficial in understanding the behavioral outcomes in smoking programs.

One could view a positive cognitive set as an important resource in the mastery of behavior change.

Bandura was also instrumental in refocusing attention on environmental influences in the modification of behavior. He prompted interest in this area with his seminal work in modeling(Bandura, 1971). By observing another perform, one has the opportunity to acquire a new behavior, disinhibit a response infrequently performed, strengthen a current behavior via positive reinforcement, or curtail future performance if the model received punishment.

In order to systematically investigate the influence of social environment on risk behavior, social scientists have developed the construct of social support. Operational definitions of social support currently abound in the literature and several significant relationships between this construct and health outcomes have been reported. These include recovery from mastectomy(Bloom, Note 5), maintaining weight loss(Brownell, Heckerman, Westlake, Hayes & Monti, 1978), preventing mental depression(Wilcox, 1982), and improving smoking quit rates(Janis & Hoffman, 1970; Mermelstein, Lichtenstein, & McIntyre, 1983a; Mermelstein, Cohen, & Lichtenstein, Note 6; Ockene, Benfari, Nuttall, Hurwitz, & Ockene, 1982).

Correlational studies looking at patterns of partner's smoking behavior have found that the behavior of one spouse often affects the other member of the dyad. In a retrospective survey of exsmokers, Grahm and Gibson(1971) found that successful abstainers were more likely to have family members who had also quit. Moreover, Tongas, Patterson, and Goodkind (Note 7) reported that the majority of participants in a behavior-change program who had spouses that smoked later relapsed. Price, Chen, Cavalli-Sforza and Feldman(1981) similarly found in their

mail survey of 109 Denver couples that spouses did not change their smoking behavior independently of one another. Finally, Lauer, Akers, Massey and Clark(1982) in their investigation of adolescent smokers revealed that 74% of teens whose parents and best friend smoked reported themselves as smokers, whereas only 3% of the teens who had neither parents or close friends who smoked described themselves as smokers. These surveys suggest that one's social environment may indeed play an important role in promoting or deterring change in health behaviors.

Stronger evidence for the role of social support as a facilitator of change comes from empirical work where support has been measured prospectively. The original contributors to this empirical testing of support in cigarette abstinence has been Mermelstein and colleagues at the University of Oregon who developed the Partner Interaction Questionnaire (PIQ). This 76 item scale consists of two parts that measure perceived helpfulness of various partner behaviors (e.g., complimented me on my efforts to quit), and the frequency with which the partner performed these behaviors during the past week. Mermelstein et al.(1983a) administered the PIQ to 46 subjects during the fifth week of a six week behavioral treatment program and at one month following program termination. Three one-way ANOVA's were performed for smoking status at end of treatment, one month, and at three months to test for differences in partner support among quitters, continued smokers, and recidivists. Partner support was significantly related to outcome in all three analyses at the $p < .01$ level. Based on a cluster analysis of the 76 items, four dimensions of support were consistently sorted by 12 judges. These included: positive reinforcement, cooperative participation, nagging, and policing. When correlated with abstinence, these dimensions provid-

ed the respective associations: $r = -.32$ ($p < .01$) for nagging/punishing; $r = -.02$ (ns) policing; $r = +.45$ ($p < .01$) for positive reinforcement; and $r = +.29$ ($p < .05$) for cooperative participation.

These clusters were then entered as independent variables in a multiple regression to determine the amount of variance accounted for in end of treatment smoking status. Partner clusters explained 32% of the outcome variance, with the reinforcement cluster accounting for the largest percentage. Interestingly, there was a trend (nonsignificant) for nonsmoking partners to provide less support to the participants than present or ex-smoking spouses.

In a second study, Mermelstein et al. (Note 6) investigated the facilitative effects of social support as well as the barriers to modifying smoking in 64 subjects undergoing a behavioral treatment program. In this study, support was assessed with several measures including the PIQ, the Interpersonal Support Evaluation List (ISEL) which is a measure of global support unrelated to smoking, and two social environment questions regarding number of friends and co-workers who smoke. Life stress, conceptualized as a potential barrier to quitting, was assessed with the Life Events Scale and was given before treatment began as well as six months afterwards.

End of treatment smoking status was predicted by fifth week administration of the PIQ, but not with either pre treatment stress scores or the ISEL. However, when maintenance of nonsmoking was examined in subsequent months, stress experienced after treatment predicted relapse as did low partner support on the PIQ. Two complimentary findings emerged regarding social environment in this study. There was a trend for abstainers to report fewer smokers in their social environment than continued smokers. Secondly, continued smokers had higher

scores on ISEL that subsequently predicted increases in smoking behavior. It was the authors' interpretation that this deleterious change may have occurred because of encouragement from fellow smokers to resume the habit.

Ockene et al.(1982) were interested in describing subject characteristics of 164 MRFIT men who underwent a 10 week nonaversive cessation program. The authors proposed a model of smoking behavior change that included the psychosocial factors of stress, personal security (elements of which are similar to self efficacy), and partner social support. The basic hypothesis of this model was that successful behavior change was facilitated by psychosocial assets such as personal security and partner support, and hindered by stress. Further, the authors hypothesized that these variables were related in a nonlinear way.

Partner support in this study was defined as the total number of group intervention sessions attended by a subject's partner. A second measure consisted of a description regarding the number of individuals and their smoking habits in the subject's environment. T test results between smoking status (abstinent versus smoker) and the second measure of social support suggested that one's environment had a significant impact on smoking status. Finally, individual univariate tests revealed an association between predictors of stress, personal security, and social support and the outcome of one's smoking status.

In summary, social support related to smoking behavior, plays a substantial role in improving treatment outcomes. Moreover, its effect may be more important in maintaining nonsmoking in the months following formal treatment than in promoting initial cessation. As cited earlier, maintaining behavior change presents the greatest challenge to a person wishing to stop smoking.

B. Determinants of relapse.

A cognitive-behavioral model of relapse has been proposed by Marlatt and Gordon(1980) to address the question "under what conditions do the effects of treatment fail". Based on extensive research with chronic alcoholics, these authors have found that relapse is more likely to occur under one of two circumstances: with the experience of a negative mood state (e.g., anger or frustration), or in a situation where the individual is confronted with social pressure.

On the basis of a detailed, situational analysis of relapse episodes, a heuristic model describing the components of a transgression was developed by Marlatt and Gordon. Briefly outlined, the condition of abstinence was viewed as providing a perception of control to the individual. As long as a high risk situation challenging this confidence does not arise, a person will be able to maintain control over the addiction. However, if such a situation is confronted, then coping resources to get over the hurdle or past the feeling of helplessness become essential to maintenance. The more experience one has in mastering these challenges, the greater the improvement in efficacy expectations. But what if coping skills are not performed in response to a high risk situation? Marlatt and Gordon see this happening if such skills were never acquired or if emotive factors such as anxiety or fear inhibit their execution. Under these circumstances, relapse has a high likelihood of occurring.

The transgression (e.g., smoking a cigarette) sets into motion several additional forces that serve to increase the impact of a slip. Marlatt and Gordon describe these psychological repercussions as the "abstinence violation effect" (AVE), This mechanism involves two separate processes: 1) cognitive dissonance in one's self image as an ex-smoker, and 2) attribution of failure to self. The end

result of one slip therefore, is extremely damaging to the long term process of maintenance. One cigarette results in lowered efficacy expectations regarding one's personal sense of mastery, and the feeling of guilt that is resolved by attributing the slip to a lack of will power. In support of this spiraling theory, Marlatt and Gordon reported that 74% of chronic alcoholics treated in a behavioral aversion program relapsed after a single slip.

Empirical studies that have sought to clarify commonalities in relapse situations concur with Marlatt and Gordon's model. Lichtenstein, Antonuccio and Rainwater (Note 8) for example, explored the process of relapse in volunteers who had quit smoking on their own and had been abstinent for at least two weeks prior to a slip. They found that relapse was consistently associated with a social environment in which at least one other person was smoking and alcohol was present. Key factors in recidivists who had completed a behavioral therapy program were personal problems, a belief that they had their habit under control and job tension. Shiffman(1982) conducted a survey using respondents to a tobacco hot line as subjects. Seventy-one percent of the relapse crises were precipitated by negative affect or severe stress. Only one third of the relapsers were experiencing a positive mood at the time of the episode and these people were most likely to be in the presence of others smoking and/or drinking alcohol. The telephone hot line served people who had undergone a behavioral treatment program and was used as a means of promoting maintenance. Therefore, not all callers had relapsed at the time of phone contact. Interestingly, there were no differences in situational variables between relapse events and tempting or close calls. As Shiffman concluded, "once the crisis is precipitated, its outcome depends on other factors- primarily the data suggest, on the ex-smoker's coping resources."

Subjects who had used cognitive and behavioral coping strategies to avoid the temptation were most likely to be successful in maintaining abstinence.

If self efficacy and social support can be viewed as facilitators of behavior change, and stress or negative mood states as liabilities, does this equation change given the additional challenge of pregnancy? The final theoretical section in the introduction will address this question by presenting material regarding the psychodynamics of pregnancy.

Psychodynamics of Pregnancy

In order to clarify the risk behavior of smoking during pregnancy, the inclusion of a second theoretical perspective may be beneficial in generating new avenues of research. The psychoanalytic study of pregnancy provides such a framework. There are several reasons to cover this literature, the most salient being 1) the current limitations in the previous smoking cessation work based on paradigms that do not directly address the condition of pregnancy (e.g., KAP model, behavior modification), 2) the availability of an extensive body of clinical research that has focused exclusively on psychological adjustment and developmental transition during pregnancy and, 3) an offshoot of the above studies that has more recently examined the role of prenatal stress to obstetrical outcome. By reviewing this research, one may develop hypotheses regarding the association between coping with maternal transition, engaging in risk behaviors (such as drugs or tobacco use), and subsequent medical outcomes.

Psychoanalytic Contributions

The dynamics of the feminine ego have been scrutinized by psychoanalysts for many years. Essential traits of femininity described by analysts Helene Deutsch, Therese Benedek, Grete Bibring and Gerald Caplan include narcissism, masochism due to the repression of aggression, and passivity thought to be the cornerstone of Freudian femininity. Reproductive capacity and conflicts were a central area of interest to these psychoanalysts who first contributed to the theories of pregnancy adaptation.

Particular characteristics of pregnancy originally described by psychoanalysts include the concept of identity reformation, emotional turmoil, and the view of pregnancy as the period of developmental crisis (Benedek, 1949; Deutsch, 1945; Bibring, Dwyer, Huntington & Valenstein, 1961).

Bibring(1959) began her work with pregnant women after years of research on early childhood development. Her clinical intuition led her to believe that developmental problems in infants could be traced to a woman's emotional adjustment to the child while in utero. She screened a population of clinic patients to find subjects in need of therapy for a longitudinal study. According to her description and much to her surprise, the majority of pregnant patients interviewed presented with numerous psychiatric symptoms such as magical thinking, premonitions, depressive reactions, primitive anxieties, and introjective and paranoid thoughts frequently associated with one's mother. Bibring also noted the ease with which this psychological material was presented by patients at subsequent study interviews, suggesting to her that it was not deeply repressed.

Caplan (1961) was similarly surprised by the extent of fluctuating affect displayed by women throughout their pregnancies. He observed a tendency toward

increasing introversion and passivity beginning in the second trimester. This he thought was to encourage emotional affiliation between mother and her fetus. Finally, he compared the clinical symptoms of emotional lability in pregnant women to that of schizophrenic patients and proposed a neurotransmitter imbalance as the probable common cause.

Although much of the early work is primarily of historical interest, several contributions did emerge from the psychoanalysts' formulation of pregnancy as a developmental crisis. These included the rich psychodynamic descriptions portraying the period of pregnancy as a tremendous opportunity to confront, rework, and resolve psychic conflicts. This psychological work has been described as a loosening of defenses (and hence, an increase in lability), that ultimately facilitates the reorganization of a woman's object-relational structure. Two especially important areas of conflict resolution include the mother-daughter relationship (Bibring et al., 1961) and, the relationship between the woman and her partner. Without marital harmony, a woman's anger was thought to be directed at the product of their union (Deutsch, 1945). It was also proposed that issues of dependency, autonomy, and Oedipal guilt were renegotiated over the course of gestation. The resolution of these psychological conflicts was thought pivotal to the woman's maturational development and competence as a nurturing caregiver.

More recently psychodynamic researchers of pregnancy adaptation have altered their perception of pregnancy from a period of crisis to a series of specific developmental tasks. As currently formulated, these include: 1) the incorporation of the intruding fetus; acceptance of the pregnancy, 2) an increasing emotional affiliation with the fetus, identification of the fetus as part of self, 3) recognition of the fetus as a separate object; separation after quickening, and 4) the estab-

lishment of a maternal bond following delivery. As Rubin(1976) summarized, pregnancy is a period of identity reformulation, a period of reordering interpersonal relationships, and a period of maturation. Successful completion of the tasks are hypothesized to produce a satisfying maternal experience as well as enhance early mother child bonding. Conception alone does not guarantee the accomplishment of this preparatory psychological work. Instead for women less resistant to the stress posed by ego restructuring, a more complicated course of transition may ensue compromising both maternal adaptation and pregnancy satisfaction.

Empirical Support

A. Maternal adaptation.

There have been a number of empirical studies conducted in the 1970's testing the relationship of positive maternal adaptation to later medical and developmental outcomes. Follow-up indices in these studies have ranged from length and difficulty of labor, satisfaction with parenting to the quality of mother-infant interaction. Common features of studies conducted by Breen(1975), Ballou(1978), Colman & Colman(1971), Leifer(1977), and Shereshefsky & Yarrow(1973) include a prospective longitudinal design used to examine psychological changes in white, middle class, primiparous women. Highlights from these studies will be briefly presented below.

Shereshefsky and Yarrow (1973) co-authored one of the most frequently cited studies in the pregnancy adaptation literature. They followed 57 primiparous couples for a year's period spanning three months prenatally to six months fol-

lowing delivery. This project had two goals, one was to examine the psychodynamics associated with individual differences in adjustment to pregnancy, and the second was to document the effect of prenatal couple-counseling on later obstetrical outcome and infant development. This second aim was included to address earlier observations of Bibring and Caplan regarding psychotherapeutic intervention during pregnancy. Although data were gathered at only three time points, the final pool yielded over 700 variables. Included in assessment was an extensive questionnaire battery covering life history, personality traits, pregnancy experience and current stresses, and a series of projective tests (e.g., Rorschach, TAT, Sentence Completion, and Draw a Person) to tap less conscious processes.

Initial statistical analyses addressed the problem of data reduction via principle components and factor analysis, whereas group differences between counseled and noncounseled couples were tested with t tests. Salient among their findings was the lack of significant change exhibited in the psychological test data from pre to postnatal assessment. Instead, there were many individual differences (between subjects) that revealed a woman's psychological status prior to conception as the key determinant to adjustment to her pregnancy. In contrast to Bibring's clinical experience, the authors reported no psychotic-like symptoms in any of their subjects.

Most predictive of positive maternal adaptation was the initial level of ego strength and nurturance measured at three months. In addition, women who saw their own mothers as being emotionally close and empathetic, were less anxious about their own pregnancy, though this bond did not significantly predict either outcome of maternal satisfaction or incidence of medical complications. A statistically significant association was found between women with a lower level of

pregnancy adaptation and the number of medical symptoms reported. Finally, it was revealed that acceptance of and adjustment to pregnancy were thwarted in those families experiencing a high level of external stress.

In regards to the brief psychotherapy intervention, women receiving counseling had greater visualization of self as a mother early in pregnancy, exhibited greater growth toward their new identity, and experienced an easier labor and delivery than a non-treated cohort. The authors were impressed that such minimal intervention was capable of exerting a positive effect on psychological as well as obstetrical outcome.

The purpose of a second study conducted by Leifer (1977) was to trace the development of maternal feelings during gestation, as well as to clearly define these affective changes. Nineteen primiparous women were given 12 questionnaires and lengthy interviews at the beginning of each trimester, on the third postpartum day, and two months following delivery. A final questionnaire was sent at seven months postpartum. Leifer used a grounded theory approach to her voluminous data, with the intent of generating hypotheses rather than formally testing them. As a result, presentation of findings was done in a qualitative format without the tool of statistical analyses.

In tracing the origins of maternal attachment, Leifer observed that there was little emotional affiliation toward the fetus during the early months of pregnancy. This was complicated by the fact that at this point, their outward appearance had not been noticeably altered. Some women expressed doubt about the reality of conception taking place. A crucial turning point occurred for these women following the experience of quickening. Leifer reported that maternal feelings developed throughout pregnancy on a continuum in the sense that they grew in

the case of each woman, but the baseline at which they began varied. Women who displayed a great deal of emotional investment in their pregnancies were most likely to develop a more realistic sense of the transition than women that were detached.

Affective changes that Leifer identified as common denominators during gestation included an increase in anxiety, greater preoccupation with self and a corresponding decline in emotional investment directed outwards, an intensified feeling of well-being, and a marked increase in emotional lability. She reported an interesting co-existence of emotional upheaval and rapid affective change with a growing sense of adulthood, fulfillment and integration of a new maturational stage. This was most true, however, in women who entered their pregnancies with a well integrated personality and positive attitude toward their unborn child. Women classified as moderately or poorly integrated also showed a consistent trend of development throughout pregnancy. This meant for some, particularly the poorly integrated, that postpartum adjustment was more problematic and frequently complicated by emotional stress.

In conclusion, Leifer agreed that the period of pregnancy provided a unique opportunity of psychological maturation. The ability to benefit from this opportunity, however, was not uniformly found in her small sample—even though 15 out of 19 pregnancies were planned. Instead, it was the author's belief that women best equipped to grow from this new life experience were functioning at a high level prior to conception.

Breen (1975) took a somewhat different approach in her study with 50 primiparous subjects. She too viewed pregnancy within a developmental framework, but expanded this to include biological, emotional, and social growth. In her

opinion, the birth of a first child could be best described as a biosocial event calling for renegotiation in one's social environment as well as within oneself.

In order to assess these transitions, Breen employed Kelly's Repetory Grid developed out of his theory of personal constructs. This method allows one to gather information pertaining to the subject's important interpersonal relationships, as well as the salient qualities or characteristics of these ties. The advantage in using this tool as described by Breen, is its ability to assess qualitative changes in role relationships and self concept over time. In addition, subjects were also asked to do a Drawing Completion Task and respond to several TAT cards. These measures were administered at three time points, twice prenatally and once 10 weeks following delivery.

Breen coded her data on two primary themes; the renegotiation and reconciliation of the woman's relationship with her mother, and the role differentiation and change in self identity. By role differentiation, Breen examined whether the woman became more aware of her own femininity as the pregnancy progressed and hence, more clearly separate from her husband.

Three variables were chosen as criterion measures, postpartum depression, medical or labor difficulties, and ease of handling the infant (Infant Perception Inventory). Fifty-five percent of the sample experienced labor complications while one third gave some evidence of depression. Moreover, one third of the sample exhibited some difficulty with their baby demonstrated by low scores on the Infant Perception Inventory. Subjects were divided into three "adjustment" groups on the basis of their prenatal psychological data. Women well adjusted (20%), showed no evidence of disturbance on any of the test measures; the medium adjusted subsample (44%) displayed disturbance on only one measure; whereas the ill adjusted group (36%) demonstrated impairment on two or more scales.

Although Breen found no differences in outcome measures of labor difficulties, postpartum depression or Infant Status among the groups, she did observe variations in the subject's relationship with her mother and spouse. Women well adjusted to the birth of their first child were more likely to have a positive "internalized" mother image. In other words, they viewed themselves as more similar to their mothers and believed they would be confident caretakers. They also demonstrated greater role differentiation from their husbands that increased following the delivery. In contrast, the ill adjusted subjects developed discrepant views of themselves and their mothers that were most pronounced in the postpartum period.

Breen characterized her well adjusted women as "those who are less enslaved by the experience, have more differentiated, more open appraisals of themselves and other people, do not aspire to be the perfect selfless mother which they might have felt their own mother had not been but are able to call on a good mother image with which they can identify...". In short, her findings concur with both Shereshefsky and Yarrow, and Leifer in that women most likely to experience the greatest maturational growth during pregnancy can be classified a priori as psychologically healthy. Perhaps coping resources that have allowed them in the past to deal with life stresses are of sufficient quality to accommodate the special emotional demands of ego reformulation during this period.

Other studies have confirmed the theme of reconciliation with one's mother (Ballou, 1978), and the tasks of pregnancy described as incorporation, recognition of the fetus as a separate object, and final preparation for labor and delivery (Colman & Colman, 1971). The authors of this last study conducted their research as participant-observers by leading a support group for first time pregnant

couples. In addition to confirming the phenomenon of emotional lability in female participants, changes in dreaming patterns were also found. Forty percent of the dreams experienced by women involved a baby or fetus. This compared to only 1% of dreams in same-aged college women who were not pregnant.

Other researchers interested in psychoanalytic themes in pregnancy have found that women with higher levels of "reproductive conflict" as assessed by projective methods, are more likely to have a longer labor, and slower cervical dilation (Uddenberg, Fagerstrom, Hakanson-Zaunders, 1976). Davids and DeVault (1960) gave 53 pregnant women (of nonspecified gestational age), several instruments including selected TAT cards, Machover's Draw a Person, and Taylor's Manifest Anxiety Scale. Subjects were subsequently divided into two groups based on the presence or absence of obstetrical complications. Using chi square analysis, Davids and DeVault found that "complicated" subjects were significantly less likely to report a TAT figure as pregnant than women with normal deliveries. Further, a significant association in the same direction was found for the likelihood of a female figure being drawn in response to the Draw a Person test. These studies as well as those reviewed earlier support prenatal maternal feelings as predictors of postpartum adjustment and satisfactory bonding.

B. Prenatal stress and anxiety.

A second literature addressing the psychology of pregnancy has examined the relationship of prenatal stress and anxiety to obstetrical complications. Several of the constructs in this empirical vein overlap with the notion of emotional lability and maternal adaptation. For example, one could hypothesize that women undergoing a great deal of fluctuating affect may also describe themselves as ex-

periencing elevated anxiety. Or similarly, a pregnant woman not pleased by her condition may report feeling stressed about her unwanted pregnancy. Her level of maternal adaptation therefore, would most likely be perceived as lower than in the case of a planned pregnancy.

The primary contribution of these psychological studies has been their focus on medical outcomes. Prenatal anxiety in particular, has received support from numerous studies implicating it in later obstetrical complications (Beck, Siegel, Davidson, Kormeier, Breitenstein, & Hall, 1980; Crandon, 1974; Davids, DeVault & Talmadge, 1961; Davids & DeVault, 1962; Gorsuch & Key, 1974; Klusman, 1975; Jones, 1978; Lederman, Lederman, Work, & McCann, 1980; McDonald & Parham, 1964; McDonald & Christakos, 1963; Nethercut & Adler, Note 9; Norbeck & Tilden, 1983). Such complications have included preterm labor, prolonged labor, premature rupture of membranes, excessive hemorrhaging, low APGAR scores, low infant weight, admission of the infant to intensive care nursery, etc. Although there has been little consensus on when prenatal anxiety is most predictive of subsequent events, there is agreement regarding it as the single best predictor of outcome (see McDonald, 1968 for review).

Life stress has also received empirical scrutiny for its role in predicting similar negative outcomes (Gorsuch & Key, 1974; Jones, 1978; Nethercut & Adler, 1983; Norbeck & Tilden, 1983; Nuckolls Cassel & Kaplan, 1972). A significant association between stress and complications, however, has been found for stress events experienced preceeding pregnancy (Norbeck & Tilden, 1983), during the months of gestation, but only when measured after delivery (Gorsuch & Key, 1974), or to be inversely related to outcome (Jones, 1978). The researcher in this last study argued that women with greater levels of prenatal stress had more op-

portunity to practice their coping skills and hence, did better during labor. This speculative explanation needs to be replicated in a better controlled study.

In summary, it becomes apparent from reviewing empirical work on the psychodynamics of pregnancy that a great deal of variation is present in a woman's response to her pregnancy. This reaction can take the form of a systematic reworking and reordering of several primary relationships, not without moments of depression or anxiety. Or, it can be faced with an overriding sense of hopelessness, loss of control or unpreparedness to meet future demands. The emotional challenges or demands of pregnancy require coping skills to maintain day to day functioning as well as to reap the maturational rewards of this life transition. Studies investigating the construct of maternal adaptation suggest that these coping resources, if they are to be sufficient, are present prior to pregnancy. In other words, a well integrated individual will be the most likely to benefit from the maturational rewards of pregnancy. Shereshefsky and Yarrow offer that insufficient or marginal coping skills can be successfully augmented through short term counseling.

There are several shortcomings in the psychodynamic literature due to the emphasis on first experience with childbearing of wanted if not planned pregnancies. Further, the experience of middle class couples has been oversampled, and may not be representative of pregnancy adaptation across all SES strata. There is ample evidence that suggests lower class women experience in general, more emotional, somatic, and psychosomatic disorder (Schwab, Bell, Warheit, & Schwab, 1979), report higher levels of prenatal stress (Stott, 1973; Zajicek & Wolkind, 1978), and are at higher risk for a complicated pregnancy (Papiernik & Kaminiski, 1974; Rush, 1977).

The important point raised by this discussion is that there appears to be a relationship between prenatal psychological states, coping resources, and ultimate obstetrical outcome. The next section will present an integration of the behavioral smoking literature and the work on the psychodynamics of pregnancy, as well as study hypotheses.

Integration

The aim of this dissertation is twofold, 1) to explore the psychological variables associated with positive changes in smoking behavior during pregnancy, and 2) to identify the barriers that interfere or prohibit making such a change. The introduction has presented theoretical constructs from two discrepant literatures previously found to be important in coping with tobacco abstinence and pregnancy transition. The variables of primary interest are the cognitive asset of self efficacy, the environmental facilitator of behavior change, social support, and the psychodynamic construct of maternal adaptation. These resources are believed to enhance a woman's capability to modify her smoking behavior during pregnancy.

What happens, however, when these resources are absent or are available in limited quantity? Further, what factors interfere with a sense of efficacy or a feeling of fulfillment regarding one's pregnancy? There are many additional stresses to pregnancy that tax the coping assets of both the woman and her partner. Some of these include the wantedness of the pregnancy, the extent of interruption to career or school plans, financial burdens, the ability to extend one's energy to accomodate the physical demands of pregnancy as well as one's present family, medical complications that threaten the viability of the fetus, and finally, the stress created by foregoing personal habits such as alcohol or tobacco. Some

women view giving up cigarettes during pregnancy as an unreasonable burden since smoking in the past has been a primary tool to help cope with stress (Graham, 1978). A preliminary report attests to this relationship between smoking and stress in pregnant women. Picone, Allen, Schramm, and Olsen (1982) found that "heavy" pregnant smokers (>30/day) reported more family problems, rated their personal lives as less satisfactory, and had more unplanned pregnancies than nonsmokers.

Several differences in perception of the pregnancy experience could be postulated to effect smoking behavior. For example, the event of pregnancy for couples with less financial security may be met with more ambivalence than for middle class couples desiring to begin a family. Cigarette smoking during pregnancy in women from lower classes may provide a coping strategy to deal with the additional stresses brought on by pregnancy. It is also possible that pregnant smokers do not possess an adequate repertoire of coping strategies, regardless of SES level, to deal with both the emotional lability of pregnancy as well as abstinence from cigarettes. Cigarette smoking as a means of coping with emotional stress may increase in some women during their pregnancies who are feeling particularly overwhelmed or under duress. Such increases have been observed in a segment of at least two pregnant populations (Baric et al., 1976; Hughes et al., 1982).

Additionally, the perception of control may be different for women reporting greater stress in pregnancy than for women with fewer worries. Self efficacy, a coping construct that presumes personal mastery and confidence, may be less prevalent in stressed, pregnant smokers than in women able to modify their smoking. Exerting control over smoking during a time when other pressures (e.g.,

financial, marital, etc.) are exaggerated may not seem within grasp for all women.

Finally, the amount of partner support as an important coping adjunct in cigarette abstinence may be more available to women in situations where the pregnancy was actively sought and planned. It is reasonable to presume that partner support for health promoting behaviors may extend to a general interest in the emotional well being of a woman during this transitional period.

In summary, the interrelationships among the three main independent variables of perceived self efficacy and partner support in quitting, and maternal adaptation to pregnancy will be explored as will their independent contributions to smoking status. In addition to examining these variables, key factors thought to covary with smoking status (e.g., heavy or light smoker, parity, SES level, etc.) will be tested. Since intervention attempts in the past have been received with only minimal enthusiasm, findings from this research may suggest that an effective treatment intervention will have to focus as much on the perceived and real stresses of pregnancy as on enhancing levels of self efficacy expectations and partner support for abstinence.

HYPOTHESES

The design of this research allowed for testing the relationship between predictor variables self efficacy, partner support, and maternal adaptation and the outcome of smoking during pregnancy. Smoking status was defined in two ways; as a dichotomous outcome of abstinence versus smoker at study entry, and as a continuous variable of number of cigarettes smoked at 30 weeks with baseline smoking as a covariate.

The hypotheses to be examined fell into three broad categories; primary, secondary, and exploratory. They are described in order of importance.

Primary Hypotheses

- 1) A positive relationship will be found between self efficacy, and partner support directed at abstaining from tobacco and a reduction in smoking behavior.
- 2) High maternal adaptation will predict a decrease in smoking during pregnancy.
- 3) Women with high self efficacy, partner support and maternal adaptation will be the most successful at reducing their smoking during pregnancy.

Secondary Hypotheses

- 1) There will be a positive relationship between a woman's smoking status and that of her partner's.
- 2) The effects of partner support will depend on whether a woman is feeling stressed during the pregnancy. Women who report lower levels of partner support during their pregnancy and a greater amount of stress (both measured in the third trimester) will be less successful at reducing their smoking than women with more support and less stress.
- 3) A positive correlation will be observed between self efficacy expectations and behavioral intention regarding one's plans for smoking reduction during pregnancy.
- 4) High self efficacy, however, will be a stronger predictor of a reduction in smoking in the third trimester than behavioral intention.

Another group of secondary hypotheses concerns the association of health knowledge regarding tobacco effects, sense of personal susceptibility, and source of health information.

- 5) High self efficacy and partner support will show a stronger relationship to a reduction in smoking than extent of health knowledge regarding fetal risks.
- 6) Friends and relatives will be a more influential source of health information and hence will have a greater relationship to smoking outcome than physicians. In addition, there will be a negative relationship between the absolute number of health information sources and smoking status.

7) A significant association will be found between a high sense of personal susceptibility to the ill fetal effects of tobacco use and a decrease in smoking.

Exploratory Hypotheses

Finally, there are two areas of exploratory interest that include projective test data and strategies utilized by a subject to alter her smoking behavior.

1) Women who tell a story that includes a cigarette in response to a stimulus picture (TAT) that specifically includes one will be more likely to stop smoking during pregnancy than women who do not mention the cigarette.

2) Subjects who perceive an ambiguous figure as pregnant will be more likely to have higher maternal adaptation scores than women who do not view the stimulus figure (TAT) as pregnant.

3) Women who respond to a family theme stimulus card (TAT) with three figures by telling a story that includes an infant will obtain higher maternal adaptation scores than women who exclude the infant.

Although directional hypotheses will not be made for specific types of strategies to avoid smoking (e.g., cognitive, behavior substitution, environmental change, etc.), it is predicted that women who possess several strategies to avoid or reduce will be more successful in altering their smoking than women who have few or lack all together such strategies. Strategies most highly correlated with abstinence will be examined.

METHODS

Subjects

Subjects for this study were 78 pregnant women of mixed parity recruited from two urban hospital clinics. All women received a screening interview by clinic nurses who asked them whether or not they smoked. Responses were grouped into three categories: 1) nonsmoker 2) current smoker, and 3) smoker prior to pregnancy. Subjects were selected from the later two categories. Criteria for study entry included English speaking, 18 year of age or older, and a gestational age of less than 21 weeks. Refusal rate was low at the primary clinic site with 5% declining to participate. Recruitment at the second site was more difficult due to scheduling and clinic logistics. Small numbers were involved: three women declined to participate and three accepted.

Procedure

Potential subjects were located by screening medical charts on the day preceding a clinic visit. All women had at least one prior visit with a provider before being asked to participate in the research. Once a person meeting study criteria was located, she was approached by the researcher in the clinic waiting area. The purpose of the research was briefly explained. She was told that 1) a study was being conducted to look at what made it easier or more difficult for women to change their smoking during pregnancy, 2) information would be col-

lected by filling out several questionnaires and submitting to a brief interview, and 3) she would be recontacted later in her pregnancy and asked to complete two final questionnaires. She was also informed that all information was confidential and would not be shared with her health provider. If consent was granted, the woman signed consent forms and was asked to fill out the questionnaires while waiting. Since the clinic flow varied from one day to the next, some women were able complete only one or two questionnaires before being seen by the staff, while others completed all five questionnaires plus the brief interview during their wait. In the typical case, a woman was able to fill out most of the questionnaires beforehand, and was interviewed following her visit with the practitioner. Subjects were given the opportunity to take their uncompleted questionnaires home if their time was limited. They were given a stamped envelop to return their forms to the researcher, and asked to complete the forms later that same day. Five percent of the women neglected to return one of their questionnaires despite a reminder postcard and telephone call.

The interview was taped for the purpose of scoring and performing reliability ratings at a later date. Two interviews were conducted over the phone on the day following a clinic visit due to time constraints while visiting the provider. Oral responses were scored on an interview coding sheet at the time of phone contact. Otherwise, all interviews were conducted in the clinic following questionnaire completion. Interviews lasted approximately 20 minutes and covered the areas of pregnancy planning, feelings toward mothering, health habits, and smoking. A subsample of 55 women were also shown three TAT cards at the end of the interview. Afterwards women were thanked for their time and reminded that the researcher would be contacting them at the clinic again when they began their third trimester.

Once each subject reached her 30th week of gestation, the researcher screened appointment calendars to locate the time and date of her next visit. The woman was met at the clinic by the researcher and asked to complete the last two study questionnaires. Smoking outcome and variables of stress and partner support were assessed at this final meeting.

Although only urine samples from subjects reporting abstinence were later subjected to laboratory verification, all subjects were required to provide urine at the time of follow-up. This procedure was performed to promote a bogus pipeline effect with the intention of improving the validity of self report. Urine samples were frozen and then transported to an independent lab. Laboratory technicians, blind to study hypotheses and smoking status of each participant, performed assays of nicotine and cotinine.

Materials

Questionnaires, an interview, and projective tests served as the three types of study materials. They are described in order of study use below.

Study Entry

1) Background Questionnaire: This instrument, developed for the purpose of the study, consisted of demographic items (e.g., ethnicity, age, partner status, educational level, and occupation), questions concerning reproductive experience (e.g., previous births and complications, amount of nausea in present pregnancy and advent of quickening), smoking characteristics (e.g., number of years smoked, number of cigarettes per day, intention regarding smoking behavior change during pregnancy, etc.), and questions regarding whether they had been told to modify their smoking, and if so, by whom (see Appendix A).

2) Condiotte and Lichtenstein's(1981) Confidence Questionnaire: This 37 item scale, consisting of situations in which people are likely to smoke, was used as a measure of self efficacy. Subjects are asked how likely they think it is that they would be able to resist the urge to smoke under a variety of circumstances including when: feeling bored, feeling anxious, while drinking an alcoholic beverage, waiting for someone, etc. Responses are on a scale of 1 (no confidence) to 100 (extreme confidence) and reflect how confident a woman is that she would not smoke in certain situations. The items were summed and divided by 37 for a final score. The higher the total score, the greater the woman's confidence that she can resist smoking. This measure has proven predictive in the past of behavioral posttreatment smoking status (see Introduction). It was included as a key measure of self efficacy and as a diagnostic tool to help determine the type of situations particularly challenging to stopping smoking while pregnant(see Appendix B).

3) Brod's (Note 10) Self Efficacy Assessment Scale: This shorter scale (18 items) addresses components of efficacy expectations rather than past performance. For example, people are asked how tense or uncomfortable they feel when they think about quitting (physiological feedback), and how many people they know who have tried to quit (vicarious feedback). The response scale for these items (excluding quantitative questions) ranged from 1 to 5 where 1 represents Not At All and 5 represents Extremely. Three items were added for the purpose of this study to inquire about smoking during pregnancy. Women were asked how many others they knew who had smoked while pregnant, how many of them tried to quit, and in looking back, had any "continued smokers" wished that they had stopped(see Appendix C).

4) The Partner Interaction Questionnaire (Mermelstein et al., 1983a): The social support measure consisted of two sections. In the first section, women were asked to rate how helpful she would find it if her partner performed certain behaviors. She was instructed to use a three point scale in rating each item unhelpful (-1), neither (0), or helpful (+1). In the case where a behavior had not been exhibited by her partner, she was told to rate that item by imagining how helpful or unhelpful such behavior would be. Items included such things as, "complimented my not smoking", "commented that I looked healthy", "offered me a cigarette", "asked me to quit smoking." In the second half, women were exposed to the same items but asked instead to indicate how frequently they had occurred in the past week. Subjects used a 0 to 3 scale to indicate whether her partner had not performed the behavior at all (0), had done so once (1), 2 to 3 times (2), or more than 4 times (3). Certain original items dealing with partner support of treatment programs were eliminated from the questionnaire. In addition, one item was added addressing the fetal effects from smoking which read, "commented that smoking is harmful to the fetus." The final format of this questionnaire consisted of 56 items. This weighted scale served as the primary assessment of social support, and was scored by multiplying the helpfulness score by the frequency of occurrence and summing for a total score(see Appendix D).

5) The Pregnancy Experience Questionnaire: This nine item scale, developed for the study, was used as one measure of a woman's adaptation to her pregnancy. Items covered the planning of the pregnancy, feelings of ambivalence, perceived changes in one's identity, relationship with partner and parents, and overall appraisal of the pregnancy experience. Items reflecting changes in one's identity/

role were scored for extent of change and feelings regarding that change (e.g., "Do you think being pregnant will change your relationship with your partner?" "How will you feel about this change most of the time?"). Affective questions regarding ambivalence and overall appraisal were scored on an ordinal 1-5 scale. (see Appendix E).

6) Unstructured Interview: In addition to completing questionnaires, patients were interviewed to gather qualitative, open-ended data. The protocol was specifically developed to address study hypotheses and entailed 13 questions. Women were asked their initial reactions to pregnancy confirmation, their partner's reactions, and about the timing of the pregnancy. A second related area of questions concerned feelings about their maternal capability and the frequency with which they visualized themselves as mothers. Following this, questions focused on health risk behavior and the most important health habits to maintain during pregnancy. Subjects were asked directly about their smoking behavior and plans for change under consideration. Strategies to accomplish this modification were also elicited. Finally, several questions concerning health effects of smoking were posed. Women were asked to explain in their own words how smoking affected the fetus. In addition, they were asked to name any negative repercussions from their smoking that they had experienced. (see Appendix F).

7) Projective Measures: Three TAT cards were included as exploratory measures in this study. Two were designed for this project and a third was a standard card from Murray's(1943) collection (card 7GF). Card #1 pictured a pregnant woman seated alone in a rocking chair. She faced a window that looked out on a quiet street. Her expression was drawn to be ambiguous. In her hand farthest from the

viewer but in clear sight, she held a cigarette. Card #2 contained two figures, a male and female who stood facing slightly away from each other. The female was drawn with a loosely shaped dress so that the outline of her figure was obscured. Her expression was designed to connote some sadness and she held a handkerchief in one hand. The man's expression was drawn to appear somewhat angry. He stood with both hands in the pockets of his slacks. Card #7GF was illustrated with three figures, an older woman, a preteen girl, and a baby doll that was ambiguously drawn to be seen either as a doll or an infant. The two main figures were seated on a couch with the older woman reading to the preteen girl. The girl, looking off in the opposite direction of the older woman, was clutching the small figure(see Appendix G). Subjects were shown cards in the same order and asked to provide a brief story addressing questions of: who are these people, what are they thinking or feeling, what will happen in the future. Card responses were coded using a straight-forward scheme that identified the inclusion of certain items in a story (e.g., cigarette, baby, etc.), or if the outcome of a story was positive, negative or neutral. Card responses were taped for later reliability checks performed by a second rater.

Third Trimester Follow-up

1) Follow-up Questionnaire: Twenty items were included on this scale covering a range of topics. Developed for this study, it tapped the areas of stress, smoking, and preferences for potential programs that could have been helpful to them in reducing or stopping smoking. Women were asked first to rate on a 1 to 5 scale the degree of stress experienced during pregnancy in a variety of 12 areas (e.g., finances, work, relationship with partner, etc.). Secondly, inquiry was made

about present smoking status, hardest cigarette to give up, partner's opinion of her smoking, and future plans regarding smoking once the baby was born. Lastly, women were given a list of eight program ideas and asked to indicate which two would have been helpful in strengthening their efforts to abstain(see Appendix H).

2) Partner Interaction Questionnaire (Mermelstein et al., 1983a): This questionnaire was readministered with a slight modification in directions. Subjects responded to the number of times her partner performed a behavior over the course of pregnancy as opposed to the previous week. This second assessment served as a retrospective report of partner support received throughout the first two trimesters of pregnancy.

Data Analysis Plan

Data analysis consisted of a series of four steps. The file was first checked for outlying values by examining descriptive statistics. In addition, computer calculated scores for several of the questionnaires were checked against hand calculations to ensure accuracy. Secondly, inter-rater reliability tests were performed on items from the unstructured interview and TAT responses. Response categories that were not reliably discriminated were combined for the two raters, or were deleted all together if agreement was still not of sufficient magnitude with this method. Thirdly, data reduction techniques were applied to 1) developing a composite score of maternal adaptation, 2) selecting one primary measure of self efficacy, and 3) choosing key covariates for hypothesis testing. The final step was to test research hypotheses.

RESULTS

Sample Characteristics

Background data are presented in Table 1. The mean age of participants was 28 years, and at the time of study entry, most had completed 15 weeks of gestation, but had not yet experienced quickening. Fifty-one percent of the sample was Caucasian, with the remaining from a diversity of ethnic backgrounds. Overall, most subjects(88%) were from the middle to lower middle classes(Hollingshead & Redlich, 1958), worked outside the home(67%), and had a partner(95%). Four women described themselves as single.

Pregnancy History

The sample was divided between primiparous (53%) and multiparous women(see Table 1). Sixty-five percent of the pregnancies were described by subjects as unplanned though not necessarily unwanted. Twenty-eight percent reported using no form of contraception yet were not seeking to become pregnant at the time. Of the 38 multiparous women in the study, 49% reported some form of complication with a previous pregnancy. These ranged from excessive bleeding in the afterbirth to a stillborn infant.

TABLE 1A
BACKGROUND CHARACTERISTICS OF SAMPLE

<u>Age</u>	<u>Number of Subjects</u>	<u>Adjusted Percent</u>
Under 20 years	5	.06
20-29	45	.58
30 and over	28	.36
<u>Gestational Age</u>		
10-13 weeks	24	.31
15-17 weeks	35	.45
18-20 weeks	19	.24
<u>Ethnicity</u>		
Caucasian	40	.51
White Latino	13	.17
Black	10	.13
Chinese	4	.05
Japanese	3	.04
Filipino	4	.05
Other	4	.05
<u>Hollingshead's Social Position</u>		
Class 1	4	.05
Class 2	11	.14
Class 3	25	.33
Class 4	37	.48
Class 5	0	0
Missing	1	--

TABLE 1B
BACKGROUND CHARACTERISTICS OF SAMPLE

<u>Maternal Education</u>	<u>Number of Subjects</u>	<u>Adjusted Percent</u>
High School or less	24	.31
College	41	.53
Post College	13	.16
<u>Maternal Employment</u>		
Working outside home	51	.67
Homemaker	25	.33
Missing	2	--
<u>Marital Status</u>		
Married, Living together	42	.54
Married, Living apart	5	.06
Partnered, Living together	16	.21
Partnered, Living apart	11	.14
Single	4	.05
<u>Parity</u>		
Multiparous	37	.47
Primiparous	41	.53
<u>Quickening</u>		
Yes	18	.23
No	60	.77
<u>Level of Nausea</u>		
None	9	.12
Some	44	.56
A lot	25	.32

Smoking Characteristics

Sample characteristics for smoking behavior are presented in Table 2. Women reported a mean smoking history of 10 years with a range of 1 to 25 years. Before pregnancy, they consumed on the average, slightly more than 20 cigarettes a day (range:1 to 60), with a mean calculated nicotine intake of 19.94 mg. per day. Three quarters of the women reported at least one previous quit attempt.

Once the current pregnancy was confirmed, 33% of the participants reported quitting all together. Reasons for abstaining given most frequently by these women included, nausea(50%) and fear of harming the fetus(39%). For continued smokers, the mean number of cigarettes reported smoked per day decreased to 10. When asked about smoking over the course of pregnancy, 39% of the continued smokers said they planned to quit, and all but one subject reported plans to reduce.

When asked about sources of health information concerning the damaging effects of tobacco on the fetus, 62% of the women reported receiving such information from relatives, 54% named health providers, and 53% named friends. Ten percent of the sample commented that no one had suggested that they modify their smoking while pregnant.

TABLE 2A
SMOKING CHARACTERISTICS OF SAMPLE

<u>Number of Cigarettes Smoked/Day Before Pregnancy</u>	<u>Number of Subjects</u>	<u>Adjusted Percent</u>
10 or less	17	.22
11 to 20	39	.51
21 to 30	16	.20
31 or more	6	.07
 <u>Number of Years Smoked</u>		
5 or less	20	.26
6 to 10	30	.38
11 to 15	17	.22
16 or more	11	.14
 <u>Nicotine Intake Before Pregnant</u> (nicotine x number of cigarettes/day)		
10 mg. or less	11	.15
11 to 20 mg.	36	.47
21 to 30 mg.	19	.26
31 to 40 mg.	4	.06
41 mg. or more	4	.06
Missing	4	--
 <u>Smoked With a Prior Pregnancy</u>		
Yes	28	.76
No	9	.24
Not pregnant before (missing)	41	--

TABLE 2B
SMOKING CHARACTERISTICS OF SAMPLE

<u>Made Quit Attempt in the Past</u>	<u>Number of Subjects</u>	<u>Adjusted Percent</u>
Yes	58	.74
No	20	.26
 <u>Partner Smoking Status</u>		
Current smoker	45	.58
Ex-smoker	12	.16
Nonsmoker	20	.26
Missing	1	--
 <u>Smoking Status at Entry</u>		
Quitters	26	.33
Continued smokers	52	.67
 <u>Smoking Status at Follow-Up</u>		
Quitters		
Stayed quit	21	.29
Relapsed	3	.04
Continued smokers*		
Became quit	8	.11
Reduced (not quit)	10	.14
Increased	20	.27
Remain unchanged	11	.15
Lost to follow-up (missing)	5	--

*Study entry used as the basis of comparison for changes in smoking rate.

Follow-up Sample

Of the 78 women initially recruited, 73 were available at the time of third trimester follow-up. Five women who had transferred care to other bay area hospitals were contacted by phone and mailed questionnaires to complete. Urine samples were not available from three self-reported quitters in this group. Three subjects had spontaneous abortions in their second trimester and were dropped from the study. Two women experienced preterm labor and delivery. In both cases, infants of 29 gestational weeks were delivered. These women were also eliminated from the final study sample since follow-up questionnaires had not been administered prior to labor.

At third trimester follow-up, 21 of the original 24 quitters were still abstinent. Eight women from the group of "smokers at study entry" became new quitters during pregnancy. Since most of the early quitters remained abstinent throughout gestation, it was decided to analyze their data at the time of study entry only. This was done because they had already undergone modification prior to completing study questionnaires and therefore, it was not possible to determine the factors predictive of this change.

Objective Verification Results

Assays were performed on 26 subjects reporting nonsmoking at follow-up. All but two urine samples had cotinine and nicotine values within an acceptable range indicating abstinence. The two subjects outside this range had urinary nicotine levels of 186.7 and 76.5 ng/ml and respective cotinine levels of 208.0 and 200.5 ng/ml. Their outcome score reflecting third trimester smoking behavior was adjusted for the purpose of analyses based on an estimated value of cigarette smok-

ing from urinary assays. Both subjects were judged by the laboratory technician to be smoking approximately two cigarettes a day.

Inter-rater Reliability

Items from a subset of 20 unstructured interviews and 16 TAT responses were coded by an independent rater unfamiliar with study hypotheses. Nine of the interview items were scored on an ordinal scale and four questions were coded using a nominal format. In order to evaluate inter-rater agreement for nominal item reliability, Kappa, a statistic based on chi square analyses, was selected as most appropriate (Cohen, 1960). This statistic allows one to determine the rate of agreement after correction by chance has been removed. As indicated by Landis and Koch (1977), agreement for nominal items is considered substantial for Kappa values ranging from .6 to .9, moderate between .4 to .6, and low to poor for Kappa less than .4.

Results from nominal items are presented in Table 3. Kappa values were generally high indicating substantial agreement. The two items where Kappa was below .4, guilt as a strategy to abstain from smoking, and the fetal complication of respiratory difficulty, were deleted from future analyses.

Ordinal scales were evaluated in two respects; paired t-tests to determine inter-rater agreement (a nonsignificant result representing no differences between the two raters, i.e., strong agreement), and Pearson correlation coefficients for inter-rater reliability (Weiss, Note 11). Table 4 contains the ordinal item reliability results for items from the unstructured interview. Pearson correlations for three items were sufficiently low ($<.75$) to warrant further investigation. In all three cases, raters were inconsistent in differentiating between the

TABLE 3A
INTER-RATER AGREEMENT FOR NOMINAL ITEMS

<u>Interview Question</u>	<u>Kappa</u>	<u>Agreements/ Disagreements</u>
What would make this a better time to be pregnant?		
1. Finances	.86	19/1
2. Relationship with partner	1.00	20/0
3. Relationship with parents	1.00	20/0
4. Spacing of children	.83	19/1
5. Age of subject	.77	19/1
6. School	.77	19/1
7. Career	.77	19/1
8. Housing	1.00	20/0
9. Other	1.00	20/0
What are three important health habits?		
1. Nutrition	1.00	20/0
2. Vitamins	1.00	20/0
3. Mental health	1.00	20/0
4. Exercise	1.00	20/0
5. Rest	1.00	20/0
6. Not taking wrong medications	1.00	20/0
7. Not drinking alcohol	1.00	20/0
8. Not smoking	1.00	20/0
9. Physical safety	1.00	20/0
10. Other	1.00	20/0

TABLE 3B
INTER-RATER AGREEMENT FOR NOMINAL ITEMS

<u>Interview Question</u>	<u>Kappa</u>	<u>Agreements/ Disagreements</u>
How will you manage your smoking during pregnancy?		
1. Quit cold turkey	.69	18/2
2. Use will power to not smoke	.74	18/2
3. Use my nausea to not smoke	.78	18/2
4. Think about fetal effects	.66	17/3
5. My partner will help	1.00	20/0
6. Won't buy cigarettes	1.00	20/0
7. Count my cigarettes	.89	19/1
8. Engage in another activity	1.00	20/0
9. Use guilt to not smoke*	0	18/2
10. Hide my cigarettes	1.00	20/0
11. I have no strategy	.69	18/2
What does smoking do to the fetus or to you during pregnancy?		
1. Central nervous system damage to fetus	1.00	20/0
2. Circulation damage to fetus	1.00	20/0
3. Birth defects	1.00	20/0
4. SIDS	1.00	20/0
5. Learning disabilities	1.00	20/0
6. Preterm labor	.86	19/1
7. Spontaneous abortion	1.00	20/0
8. Respiratory distress	.46	18/2
9. Nicotine/tars in fetus	.64	19/1
10. Low birth weight	.60	16/4
11. Low birth weight (do not understand)	.66	17/3
12. Decrease in general health	1.00	20/0
13. Other	.63	17/3

*One rater observed this twice, the other had no variance in her ratings. Therefore, Kappa could not be computed.

Note: All nominal categories were scored as present/absent.

TABLE 4

INTER-RATER AGREEMENT AND RELIABILITY: ORDINAL ITEMS FROM INTERVIEW

Item	Rating Scale	Reliability (correlations)	Agreement (t-test)	Agree/ Disagree
1. Female response to pregnancy	negative, ambivalent, positive	r = .83 p<.001	t = -1.00 ns.	16/4
2. Male response to pregnancy	negative, ambivalent, positive	r = .86 p<.001	t = -1.00 ns.	15/5
3. Timing of pregnancy	negative, ambivalent, positive	r = .86 p<.001	t = -1.00 ns.	16/4
4. Frequency of visualization	1=never to 8=all the time	r = .99 p<.001	t = -1.83 ns.	17/3
5. Symptoms from smoking	none, minor, major	r = .93 p<.001	t = -1.00 ns.	19/1
6. Present amount of stress	minimal, moderate, serious	r = .91 p<.001	t = -1.83 ns.	17/3
7. Mother image	warm, task oriented, cold	r = .54 p<.01	t = -.33 ns.	14/6
Mother image*	warm + task, cold	r = .79 p<.001	t = -1.00 ns.	19/1
8. Personal susceptibility	minimal, moderate, serious	r = .61 p<.005	t = .33 ns.	11/9
Susceptibility*	minimal, moderate + serious	r = 1.00 p<.001	t = 0.00 ns.	20/0
9. Feelings toward pregnancy	positive, mixed, negative	r = .65 p<.002	t = 2.52 p<.02	15/5
Feelings*	positive + mixed, negative	r = .79 p<.001	t = -1.00 ns.	19/1

*Rescored items used in analyses in place of original items.

use of a moderate, mixed or ambivalent category and a positive response. Responses for mother image, personal susceptibility, and feelings toward pregnancy were collapsed from three to two categories (positive/negative), and inter-rater values recalculated. When scores were dichotomized agreement rose substantially. These variables were subsequently recoded and used in analyses in their dichotomous form. TAT reliability is presented in Table 5. Raters had high agreement on all items excluding story outcome of the pregnant smoker. Upon closer inspection, it was found that Rater 1 coded outcomes as positive or negative whereas Rater 2 consistently used the "not clear, can't say" category. Due to this lack of agreement, the item was deleted from further analysis.

Data Reduction

Covariate selection

Separate univariate analyses were performed on potential covariates for the two groups of quitters and smokers at study entry (see Table 6). Initially considered as possible covariates were: number of cigarettes smoked prior to pregnancy, number of cigarettes smoked at study entry, number of years smoked, attempting to quit in the past, nicotine level of brand smoked, SES, ethnicity, maternal age, level of education, parity, amount of nausea, and quickening. Covariates were selected using two criteria, a univariate association with outcome at the $p < .10$ level, and a low correlation with other covariates indexing similar themes (e.g., nicotine content of brand smoked and number of years smoked). It was decided a priori that main study hypotheses would be tested using analysis of covariance, where the outcome of smoking status would be adjusted by previous level of smoking. Such a design mandated that number of cigarettes smoked prior

TABLE 5

INTER-RATER AGREEMENT AND RELIABILITY: ORDINAL ITEMS FROM TAT RESPONSES

<u>TAT 1</u>	<u>Rating Scale</u>	<u>Reliability</u>	<u>Agreement</u>	<u>Agree/ Disagree</u>
Inclusion cigarette	yes, no	$r=1.00$ $p<.001$	$t=0.00$ ns.	16/0
Outcome of story*	positive, negative, don't know	$r=.05$ $p<.84$	$t=-3.90$ $p<.001$	7/9
<u>TAT 2</u>				
Female figure seen as pregnant	yes, no	$r=1.00$ $p<.001$	$t=0.00$ ns.	16/0
Outcome of story	positive, negative, don't know	$r=.91$ $p<.001$	$t=-1.0$ ns.	15/1
<u>TAT 3</u>				
Inclusion of third figure in story	yes, no	$r=.832$ $p<.001$	$t=1.00$ ns.	15/1
Third figure seen as baby	yes, no	$r=1.00$ $p<.001$	$t=0.00$ ns.	16/0

*Excluded from further analyses.

TABLE 6

CORRELATIONS OF POTENTIAL COVARIATES WITH SMOKING STATUS AT ENTRY^a

	(2)	(3)	(4)	(5)	(6)	(7)
(1) Smoking status	.18 (.05)	.22 (.02)	.24 (.01)	.34 (.01)	-.05 (.32)	.30 (.01)
(2) Number of cigarettes smoked prior to pregnancy		.01 (.44)	.50 (.01)	-.22 (.02)	.40 (.01)	-.19 (.04)
(3) Nicotine content of brand smoked			.05 (.33)	.16 (.07)	.21 (.03)	.10 (.18)
(4) Number of years smoked				-.12 (.14)	.72 (.01)	-.09 (.21)
(5) SES					-.36 (.01)	.61 (.01)
(6) Age						.01 (.43)
(7) Education						

CHI SQUARE ANALYSES OF POTENTIAL COVARIATES WITH SMOKING STATUS AT ENTRY^a

	Test	df	p
(1) Making a previous quit attempt	chi square = .84	1	.36
(2) Quickening	chi square = 2.03	1	.15
(3) Ethnicity	chi square = 2.57	1	.11
(4) Nausea	chi square = 2.51	2	.28
(5) Parity	chi square = 2.57	1	.11

^aN = 78.

Note: p values in parentheses below correlation coefficients.

to pregnancy would be included in analyses examining quitter versus smoker differences at study entry. Predictive analyses confined to changes within the "smoker at study entry" subgroup would require the use of number of cigarettes smoked at entry as its covariate to adjust the outcome score of third trimester smoking level.

Covariates significantly related to the dependent measure for the first set of analyses (quitters versus smoker at entry), included number of cigarettes smoked/day before pregnant, nicotine content of brand smoked, number of years smoked, SES, and maternal education. Since nicotine and number of years smoked were highly correlated as well as significantly related to the outcome-adjusting covariate, only one was included in hypothesis testing. Maternal education and SES were similarly highly associated with outcome as well as with each other. SES was selected for hypothesis testing. In summary, the three covariates chosen included number of cigarettes smoked/day prior to pregnancy, SES, and nicotine.

For the subset of 52 smokers at study entry, covariate selection followed a comparable procedure. Table 7 presents the pearson correlation coefficients for potential covariates. Items significantly related to outcome included number of cigarettes smoked/day at study entry, number of years smoked, previous quit attempts, age, SES, ethnicity, nausea and parity. Since both number of years smoked and previous quit attempts were correlated with the outcome-adjusting covariate, they were not included in formal hypothesis testing. Final selection of covariates for testing independent variables in predicting third trimester smoking status included number of cigarettes smoked/day at study entry, age, SES, ethnicity, nausea, and parity.

TABLE 7

CORRELATIONS OF POTENTIAL COVARIATES WITH SMOKING STATUS IN THIRD TRIMESTER^a

	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Smoking in third trimester	.73 (.01)	.01 (.49)	.33 (.01)	.23 (.04)	.25 (.03)	-.05 (.35)	-.23 (.05)	.32 (.01)	-.23 (.05)	-.27 (.02)	.11 (.21)
(2) Number of cigarettes at entry		.09 (.26)	.18 (.08)	.27 (.02)	.10 (.23)	-.03 (.39)	-.16 (.11)	.26 (.03)	-.37 (.01)	-.29 (.01)	.05 (.36)
(3) Nicotine of brand			.05 (.35)	.13 (.17)	-.10 (.23)	.23 (.04)	.17 (.11)	-.13 (.18)	.21 (.06)	-.08 (.28)	.14 (.15)
(4) Number of years smoked				.07 (.28)	.82 (.01)	-.18 (.09)	-.18 (.09)	.31 (.01)	-.30 (.01)	-.25 (.03)	-.10 (.22)
(5) Previous quit attempts					-.01 (.47)	.18 (.10)	.02 (.43)	-.14 (.15)	-.19 (.08)	.01 (.48)	.03 (.41)
(6) Age						-.43 (.01)	-.38 (.01)	.29 (.01)	-.26 (.02)	-.19 (.08)	.05 (.35)
(7) Education							.53 (.01)	-.28 (.01)	.17 (.10)	-.05 (.34)	-.14 (.16)
(8) SES								-.24 (.04)	.09 (.25)	.01 (.33)	-.08 (.27)
(9) Ethnicity									-.12 (.19)	.16 (.11)	.22 (.05)
(10) Nausea										.28 (.02)	.01 (.49)
(11) Parity											.24 (.03)
(12) Quickening											

^aN = 52.

Note: p values in parentheses below correlation coefficients.

Independent variable selection

A. Self efficacy.

Two measures of self efficacy were included in the questionnaire battery completed by participants. The psychometric properties of the scales were examined as was the correlation between the two scales. Cronbach's alpha for Condiotte and Lichtenstein's Confidence Questionnaire was .98 whereas the inter-item correlation for Brod's Self Efficacy questionnaire was .65. The two scales were inter-correlated ($p < .0001$, $r = .4475$). In order to conserve degrees of freedom, Condiotte and Lichtenstein's scale was chosen due to its robust alpha coefficient.

B. Maternal adaptation.

The construct of maternal adaptation was developed from 15 items collected in the unstructured interview and from the Pregnancy Experience Questionnaire. Data reduction for this scale required several steps. Initially, the 15 items were analyzed in several factor analytic solutions; 1) factor analysis and 2) principle components both based on a least squares approach, and 3) Rao's canonical factoring, a maximum likelihood method. For each solution, the same number of factors with eigenvalues greater than 1.0 were produced. An advantage of the Rao's method is that it provides goodness-of-fit tests that can serve as a guideline for selecting the number of factors to retain (Kim & Mueller, 1978). Using this goodness-of-fit test, it was determined that a three factor solution best accommodated the items. The factor solution, therefore, was redone forcing a three factor solution. Items across factor analytic solutions were again similar in item weighting and eigenvalues. Since there were no a priori assumptions regarding

the dimensions of maternal adaptation, the principle component solution was selected as the most appropriate. In addition, factor loadings in this solution were easily interpretable.

Table 8 presents the rotated factor solution with individual weights of each item for the three respective factors. Factor derived scores were calculated using salient items with a weight greater than .5. These items were then put on the same metric using z transformations before being summed to produce a final factor score. The first factor (General), reflecting general response to pregnancy accounted for 24% of the total variance. The four items loading on this included the timing and planning of pregnancy, the woman's initial response to pregnancy confirmation, and the interviewer's global judgment regarding the woman's feeling towards the pregnancy. Factor two (Reorder) accounted for 13.9% of the total variance and was interpreted as reflecting a reordering of one's identity and personal relationships. The three items with weights above .5 for this factor included expectation of change in self image, partner relationship and relationship with one's mother. The final factor (Affect) was composed of items reflecting affect. These included feelings about the expectation of change in one's self image, in the partner relationship, and in one's relationship with her mother, plus one general item indexing overall feelings toward the pregnancy. Factor three accounted for 10.6% of the total variance.

Factor derived scores were next examined for their psychometric properties. As illustrated in Table 9, the Cronbach alpha coefficient for each factor indicated high internal consistency. Although Factor one was significantly associated with Factors two and three, the inter-correlation of Factor two and three was nonsignificant. A test of the reliability of difference based partially on pearson

TABLE 8
 ROTATED FACTOR LOADINGS^a
 MATERNAL ADAPTATION ITEMS

Items (abbreviated)	General Affect I	Reordering Relationships II	Feelings About Changes III
1. Planning of pregnancy	<u>.58</u>	-.27	.09
2. Ambivalent feelings	.67	-.06	.22
3. Change in self-image	-.31	<u>.68</u>	.12
4. Change partner relationship	.09	<u>.75</u>	-.19
5. Change mother relationship	-.23	<u>.69</u>	.01
6. Feelings about change in self-image	.07	.25	<u>.70</u>
7. Feelings about change in partner relationship	.11	.20	<u>.74</u>
8. Feelings about change in mother relationship	-.00	-.32	<u>.66</u>
9. Overall feelings toward pregnancy	.43	.27	<u>.53</u>
10. Timing of pregnancy	<u>-.69</u>	.12	-.07
11. Mother image	.12	-.05	.46
12. Frequency of mother visualization	.23	.48	-.08
13. Clinical judgment: Mother feelings	<u>-.58</u>	-.14	-.33
14. Woman's response to confirmation	<u>.82</u>	.05	.04
15. Partner's response	.44	-.26	-.00
EIGENVALUES	3.65	2.08	1.59
TOTAL VARIANCE	24.4	13.9	10.6

Note: n=78 with pairwise deletion of missing data. Aside from item 5 (n=58), n ranged from 67 to 78.

^aPrinciple component analysis with varimax rotation.

TABLE 9
MATERNAL ADAPTATION FACTORS:
CORRELATIONS^a, CRONBACH'S ALPHA^b, AND RELIABILITY OF DIFFERENCE^c

	General	Reorder	Feeling
General	{.749}	-.275 p=.01	-.453 p=.001
Reorder	(.64)	{.755}	-.092 p=.249
Feeling	(.41)	(.68)	{.672}

^aUpper off-diagonal values.

^bDiagonal values in brackets.

^cLower off-diagonal values in parentheses.

coefficients was computed for all pairwise combinations to determine whether the factors were distinct despite some significant associations in the correlations. A reliability of difference score below .50 indicates that scales are not measuring constructs differently from one another. Since reliability of difference scores were above this criteria, it was concluded that all three factors should be used in future analyses as distinct measures of maternal adaptation.

Hypothesis Testing Overview

As indicated earlier, the sample was divided into two subgroups for the purpose of hypothesis testing. Primary hypotheses were analyzed first using the entire sample ($n=73$) to predict smoking status (quitter/smoker) at study entry. In the case of a binary outcome, logistic regression is the preferred statistical analytic technique. However, the available computer software package used a listwise deletion method for missing data. As a result, the number of cases available in hypothesis testing became smaller as the number of covariates, main effects, and interactions increased. The least squares solution of multiple regression is an appropriate substitute in those cases where the split in outcome distribution is not less than 20/80. In this data set, 33% of the sample were quitters and 67% smokers at entry. The greatest drawback to using multiple regression is that it provides a more conservative test, and therefore requires a larger effect to achieve significance (Muthen & Speckart, 1983). Preliminary analyses using both logistic and multiple regression were performed on the first hypothesis producing similar results. Findings obtained from the multiple regression model will be presented since sample size remained stable (by substitution of missing data) throughout hypothesis testing.

Multiple regression analyses were repeated using a subset of subjects, smokers at study entry ($n=52$), to predict reported number of cigarettes smoked in third trimester follow-up. Since dividing the sample reduced the degrees in freedom for the examination of hypotheses, selected covariates not significantly related in multivariate tests to outcome were eliminated in subsequent analyses. Degrees of freedom were also conserved by testing independent variables in a series of three separate analyses, behavioral variables considered the stronger predictors of outcome in Hypothesis 1, maternal adaptation factors considered by themselves in Hypothesis 2, and a final analysis examining the contribution of all three main effects to outcome. Results will be discussed in terms of effect size and test of power where statistical significance was not achieved.

Finally, a brief note should be made regarding self report data in analyses concerning smokers at study entry. Although physiological verification techniques were not available to substantiate smokers' self reports, previous literature indicates that these data may provide generally valid measures of smoking rate (Bauman, Koch, & Bryan, 1982; Colletti, Supnick, & Abueg, 1982; Lando, 1975). Subjects in these studies were found to be truthful in their reporting without foreknowledge of an objective carbon monoxide reading to verify their verbal report. Admittedly, the generalizability of these three studies to this sample is difficult to infer. Factors such as social desirability, memory problems (e.g., forgetting), and half-pack report bias all play a role in weakening self report data. With these limitations, data for smokers at study entry were analyzed and interpreted cautiously.

Hypothesis 1

The influence of self efficacy and partner support in abstaining from tobacco was examined in this hypothesis. It was predicted that women with higher levels of self efficacy and partner support would be more likely to abstain from smoking.

Hierarchical regression that employed mean substitution for missing data was used to test Hypothesis 1. Smoking status of quitter versus smoker at study entry served as the dependent measure. Covariates in this analysis were number of cigarettes smoked/day prior to pregnancy, SES, and nicotine content of brand smoked. The set of predictor variables including self efficacy and partner support were entered next, followed in the third step by their two-way interaction. The final step tested the covariate assumptions of uniform slopes.

Regression results shown in Table 10 demonstrate that the first step accounted for 21% of the variance in smoking status at study entry. Univariate tests for the variables at this step showed that the number of cigarettes smoked before pregnancy and SES were the only statistically significant variables. The second step of the equation was also statistically significant explaining an additional 37% of the outcome variance. Univariate tests at the second step indicated that self efficacy was the one significant variable accounting for 35% of the change in R^2 . The interaction entered as the third step of the equation and the set of covariate interactions were not statistically significant. These results suggest once outcome variance had been adjusted for the two covariates of SES and cigarettes smoked/day prior to pregnancy, that self efficacy accounted for a significant portion of the residual outcome variance.

TABLE 10

HIERARCHICAL REGRESSION OF SMOKING STATUS AT STUDY ENTRY ON:
 CONDIOTTE AND LICHTENSTEIN SELF EFFICACY, PARTNER SUPPORT, AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Prior number of cigarettes	.26	.11	.25	<.014
SES	.36	.11	.15	<.001
Nicotine	.15	.11	.35	ns.
$R^2=.21$ (F=6.41 df=3,74)				<.001
<u>Step 2:</u>				
Self efficacy	-.61	.08	-.59	<.001
Partner support	-.07	.08	-.07	ns.
R^2 change=.37 (F=30.83 df=2,72)				<.001
R^2 total=.57 (F=19.28 df=5,72)				<.001
<u>Step 3:</u>				
Interaction of main effects	.14	.14	.07	
R^2 change=.006 (F=.928 df=1,71)				ns.
R^2 total=.58 (F=16.21 df=6,71)				<.001
<u>Step 4:</u>				
Interactions of covariates with main effects				
R^2 change=.036 (F=1.01 df=6,65)				ns.
R^2 total=.61 (F=8.62 df=12,65)				<.001

Condiotte and Lichtenstein's scale reflects confidence in resisting an urge to smoke in a variety of settings. It could be argued that quitters have already obtained substantial experience in overcoming the temptation to smoke. These results therefore, could be attributed to a practice effect that in a sense, defines a quitter at the time of study entry. To evaluate this hypothesis from a different perspective, the analysis was redone using the Brod measure of efficacy. In contrast to Condiotte and Lichtenstein's scale, Brod's questionnaire taps a greater number of dimensions reflecting self efficacy (e.g., physiological, environmental influence, modeling), without relying on behavioral performance. A hierarchical regression was employed using the two significant covariates in the first step, Brod's self efficacy and partner support in step two, the two-way interaction of main effects in step three, and the covariate interactions in step four. Results in Table 11 parallel those in earlier analysis, though the magnitude of effect for self efficacy was not as large. Brod's efficacy scale accounted for 14% of the variance in smoking status and was significant at the $p < .001$ level.

Hypothesis 1 was also examined for the ability of self efficacy and partner support to predict changes in smoking behavior over the course of pregnancy. A hierarchical regression was used to test the role of self efficacy and partner support in predicting the number of cigarettes smoked at study follow-up ($n=52$). Covariates for this analysis, including number of cigarettes smoked/day at entry, SES, age, parity, nausea and ethnicity, were entered as the first set. Main effects of efficacy (Condiotte and Lichtenstein's questionnaire) and partner support were entered next followed by a third set of their two-way interaction. Finally, covariate interactions were examined in step four. Table 12 presents the regression results. The first step accounted for 55% of the outcome variance in third

TABLE 11

HIERARCHICAL REGRESSION OF SMOKING STATUS AT STUDY ENTRY ON:
 BROD'S SELF EFFICACY, PARTNER SUPPORT, AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Prior number of cigarettes	.27	.11	.27	<.012
SES	.40	.11	.39	<.001
$R^2 = .18$ (F=8.44 df=2,75)				<.001
<u>Step 2:</u>				
Self efficacy (Brod)	-.38	.10	-.35	<.001
Partner support	-.02	.10	-.02	ns.
R^2 change=.14 (F=7.28 df=2,73)				<.001
R^2 total=.32 (F=8.58 df=4,73)				<.001
<u>Step 3:</u>				
Interaction of main effects	.27	.23	.11	
R^2 change=.01 (F=1.33 df=1,72)				ns.
R^2 total=.33 (F=7.15 df=5,72)				<.001
<u>Step 4:</u>				
Interactions of covariates with main effects				
R^2 change=.03 (F=.784 df=4,68)				ns.
R^2 total=.36 (F=4.26 df=9,68)				<.001

TABLE 12
HIERARCHICAL REGRESSION OF
SMOKING STATUS AT TIME OF THIRD TRIMESTER FOLLOW-UP ON:
SELF EFFICACY, PARTNER SUPPORT, AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Number of cigarettes at entry	.66	.12	.57	<.001
Nausea	.11	.11	.09	ns.
SES	-.05	.11	-.04	ns.
Parity	-.09	.11	-.08	ns.
Ethnicity	.12	.11	.10	ns.
Age	.14	.12	.12	ns.
R ² =.55 (F=9.24 df=6,45)				<.001
<u>Step 2:</u>				
Self efficacy	.03	.13	.02	ns.
Partner support	-.19	.11	-.17	ns.
R ² change=.03 (F=1.57 df=2,43)				
R ² total=.58 (F=7.50 df=2,43)				<.001
<u>Step 3:</u>				
Interaction of main effects	-.01	.23	-.004	ns.
R ² change=.00 (F=.002 df=1,42)				
R ² total=.58 (F=6.51 df=9,42)				<.001
<u>Step 4:</u>				
Interaction of covariates with main effects				
Ethnicity X support ^a	1.61	.56	.24	<.007
R ² change=.20 (F=2.27 df=12,30)				<.03
R ² total=.78 (F=5.09 df=21,30)				<.001

^aOnly significant covariate interactions are listed.

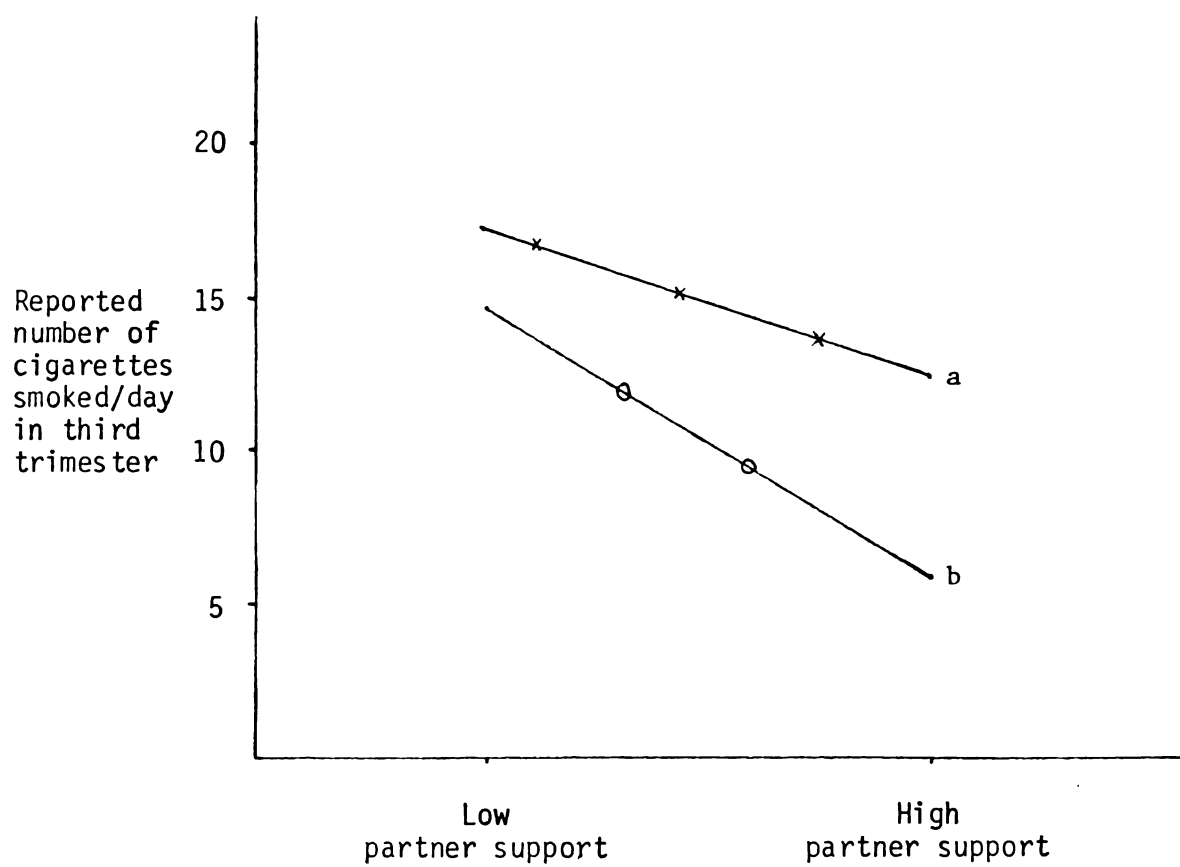
trimester smoking status. Within this set, the only statistically significant covariate explaining more than half of the set's variance (32%) was the number of cigarettes smoked/day at study entry.

Step two with the two main effects was nonsignificant accounting for 3% of the outcome variance. The covariate assumptions were not met in this analysis as indicated by statistical significance in the last step. This suggests that significant interactions within this set should be examined and considered as main effects rather than strictly covariates. Ethnicity by support was the only significant covariate interaction accounting for 5.9% of the outcome variance. Visual examination of the plotted interaction in Figure 1 revealed that partner support had a slightly greater effect in reducing cigarette smoking in nonwhite as opposed to white women.

These data suggest several conclusions regarding Hypothesis 1. For initial smoking status at study entry, it would appear that self efficacy is the sole and strongest discriminator of the two groups. In contrast to this analysis, self efficacy and partner support played a different role in reducing smoking over the course of pregnancy. Hypothesis 1 for this group received mixed support suggesting an interaction between partner support and ethnicity. Efficacy expectations however, were not involved in reduction.

In order to clarify the relationship of partner support and ethnicity to smoking status in the third trimester, an adjunct analysis was performed. The purpose of this analysis was to explore the particular dimensions of partner support most instrumental in promoting reduction. Four clusters of partner support were formed based on Mermelstein's et al. (1983a) earlier research. Items were first grouped into nagging, policing, cooperative, and positive reinforcement clusters,

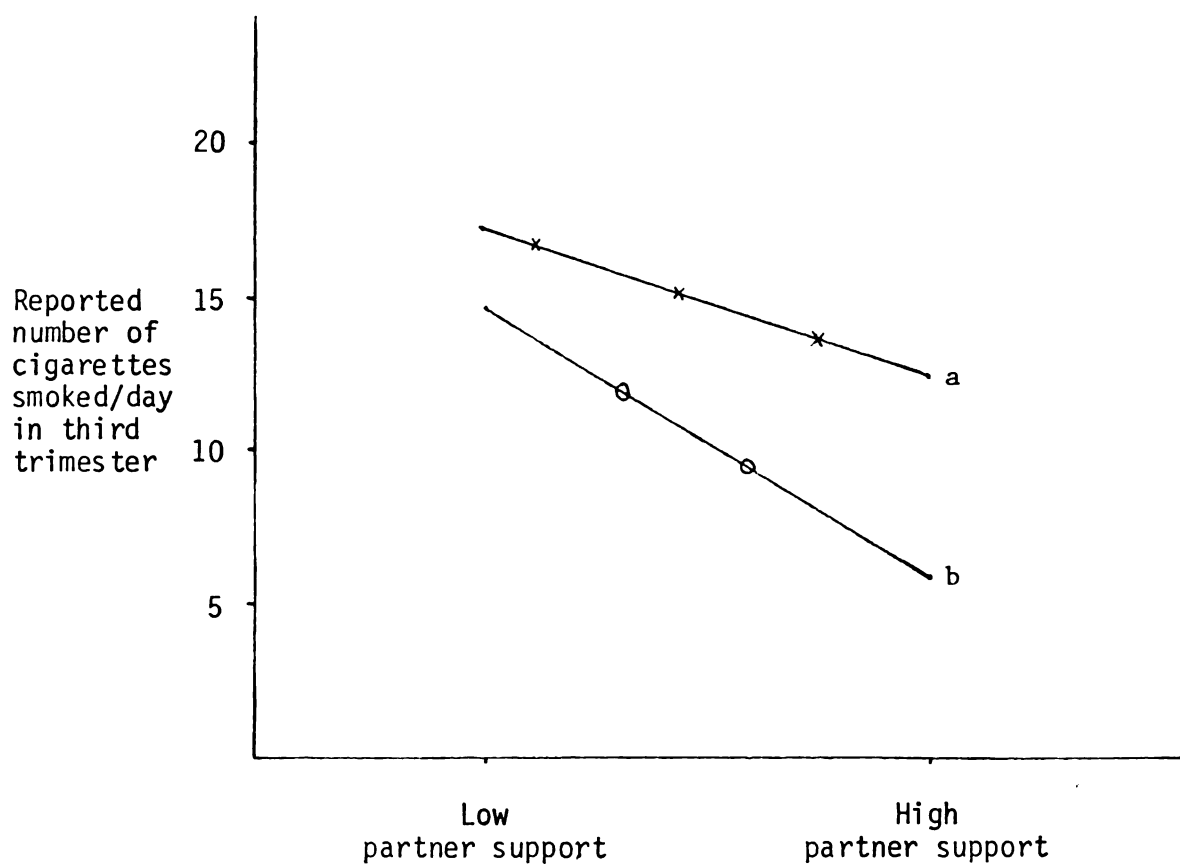
FIGURE 1
PLOTTED INTERACTION OF ETHNICITY BY PARTNER SUPPORT
BASED ON MEANS FROM MEDIUM SPLIT DESCRIPTIVE ANALYSIS



^axx=white women

^boo=nonwhite women

FIGURE 1
PLOTTED INTERACTION OF ETHNICITY BY PARTNER SUPPORT
BASED ON MEANS FROM MEDIUM SPLIT DESCRIPTIVE ANALYSIS



^a_{xx}=white women

^b_{oo}=nonwhite women

and entered into an analysis of covariance multiple regression along with ethnicity as main effects. Table 13 illustrates the order of entry and variance accounted for at each step. Although the interaction set of ethnicity by the four partner support clusters did not reach statistical significance, it accounted for close to 6% of the adjusted outcome variance. Further, the set of main effects including all five independent measures explained 7.8% of the variance (also not statistically significant). Using variance as an estimate of effect size, a power analysis (power=.8) found that with a sample size of 78, statistical significance at the .05 level would have been achieved.

Hypothesis 2

The role of maternal adaptation in modifying cigarette use was the focus of this hypothesis. It was predicted that women with greater levels of maternal adaptation as indexed by the three factor derived dimensions, would be more likely to reduce tobacco use during gestation than women with a low level of adaptation.

Hierarchical regression with mean substitution was employed to test Hypothesis 2 in predicting quitters versus smokers at study entry. Covariates significantly associated with outcome in Hypothesis 1 were retained for use in future testing. These included number of cigarettes smoked/day prior to pregnancy and SES. These were entered in the first step followed by the three factor scores of maternal adaptation in the second step. Covariate checks were entered in the last step.

Table 14 presents the results of this multiple regression. The covariates accounted for 18% of the variance and were significant at the $p < .0005$ level. The

TABLE 13

71a

HIERARCHICAL REGRESSION OF
SMOKING STATUS AT TIME OF THIRD TRIMESTER FOLLOW-UP ON:
PARTNER SUPPORT CLUSTERS, ETHNICITY, AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Number of cigarettes at entry	.70	.10	.70	<.001
$R^2 = .50$ (F=49.32 df=1,50)				<.001
<u>Step 2:</u>				
Policing	.04	.15	.02	ns.
Reinforcement	.11	.15	.07	ns.
Cooperation	-.32	.16	-.20	<.04
Nagging	-.06	.16	-.04	ns.
Ethnicity	.11	.11	.09	ns.
R^2 change=.08 (F=1.64 df=5,45)				ns.
R^2 total=.57 (F=10.12 df=6,45)				<.001
<u>Step 3:</u>				
Interactions of main effects				
R^2 change=.06 (F=1.64 df=4,41)				ns.
R^2 total=.63 (F=7.07 df=10,41)				<.001
<u>Step 4:</u>				
Interactions of covariates with main effects				
R^2 change=.04 (F=.85 df=5,36)				ns.
R^2 total=.67 (F=4.91 df=15,36)				<.001

TABLE 14

HIERARCHICAL REGRESSION OF SMOKING STATUS AT STUDY ENTRY ON:
MATERNAL ADAPTATION FACTORS AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Prior number of cigarettes	.27	.11	.27	<.012
SES	.39	.11	.39	<.001
$R^2 = .18$ (F=8.44 df=2,75)				<.001
<u>Step 2:</u>				
General	.03	.12	.03	ns.
Reorder	.20	.11	.18	ns.
Feeling	.01	.12	.01	ns.
R^2 change=.03 (F=1.05 df=3,72)				ns.
R^2 total=.47 (F=4.02 df=5,72)				.003
<u>Step 3:</u>				
Interactions of covariates with main effects				
R^2 change=.06 (F=.97 df=6,66)				ns.
R^2 total=.28 (F=2.35 df=11,66)				.02

overall set indexing maternal adaptation was not significant. Together the three variables accounted for 3.4% of the variance suggesting that maternal adaptation represented a small effect in predicting smoking status.

Hypothesis 2 was tested once again using the subset of subjects who were smoking at study entry. The number of cigarettes smoked in the third trimester was the dependent measure. In an effort to conserve degrees of freedom, covariates not related to outcome in earlier analyses were not included. Therefore, covariates for this hypothesis test consisted solely of the number of cigarettes smoked at study entry. Entered in the second step were the three variables indexing maternal adaptation, followed in step three by the test of covariate assumptions. Table 15 illustrates the results of this analysis.

The covariate was highly significant in its relationship to outcome accounting for 49% of the variance. Main effects of maternal adaptation were not significant, accounting for 3% of the outcome variance. Covariate checks were also nonsignificant. Hypothesis 2 for both groups was not confirmed.

Hypothesis 3

Hypothesis 3, the examination of all three main variables in predicting smoking status is presented in Table 16. In the first regression, smoking status at study entry served as the dependent measure. Covariates of cigarettes smoked/day before pregnancy and SES were entered as one step, followed by the five main independent variables in step two. Step three tested the two-way interactions among main effects, and step four comprised the set of covariate assumptions. As was true in previous analyses, covariates were highly significant. The step of main effects was also statistically significant accounting for 44% of the

TABLE 15
HIERARCHICAL REGRESSION OF
SMOKING STATUS AT TIME OF THIRD TRIMESTER FOLLOW-UP ON:
MATERNAL ADAPTATION FACTORS AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Number of cigarettes at entry	.70	.10	.70	<.001
$R^2 = .49$ ($F=49.32$ $df=1,50$)				<.001
<u>Step 2:</u>				
General	-.16	.11	.14	ns.
Reorder	-.02	.10	-.02	ns.
Feeling	-.05	.12	-.04	ns.
R^2 change=.03 ($F=1.06$ $df=3,47$)				ns.
R^2 total=.53 ($F=13.17$ $df=4,47$)				<.001
<u>Step 3:</u>				
Interactions of covariates with main effects				
R^2 change=.03 ($F=.85$ $df=3,44$)				ns.
R^2 total=.55 ($F=7.82$ $df=7,44$)				<.001

TABLE 16

HIERARCHICAL REGRESSION OF SMOKING STATUS AT STUDY ENTRY ON:
SELF EFFICACY, PARTNER SUPPORT, MATERNAL ADAPTATION, AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Prior number of cigarettes	.27	.11	.27	<.01
SES	.40	.11	.38	<.001
$R^2 = .18$ (F=8.45 df=2,75)				<.001
<u>Step 2:</u>				
General	.06	.08	.05	ns.
Reorder	.17	.08	.16	<.04
Feeling	.19	.09	.15	<.04
Efficacy	-.68	.08	-.63	<.001
Support	-.05	.08	-.05	ns.
R^2 change=.44 (F=16.51 df=5,70)				ns.
R^2 total=.63 (F=16.69 df=7,70)				<.001
<u>Step 3:</u>				
Interactions of main effects				
R^2 change=.03 (F=.79 df=6,64)				ns.
R^2 total=.65 (F=9.20 df=13,64)				<.001
<u>Step 4:</u>				
Interactions of covariates with main effects				
R^2 change=.08 (F=1.60 df=10,54)				ns.
R^2 total=.73 (F=6.33 df=23,54)				<.001

variance. Three factors significantly contributed to this step's significance; self efficacy (40%), and the maternal adaptation factors of Reorder (2.4%) and Affect (2.4%). Two-way interactions among main effects were nonsignificant as were the covariate interactions.

Table 17 illustrates the results from the analysis testing the predictive strength of the five independent variables to smoking status in the third trimester. The key covariate, reported cigarettes smoked/day at entry, accounted for 49% of variance. Since the two-way interactions in step three were nonsignificant, the set of main effects was examined. The five independent variables accounted for 10% of the outcome variance and nearly reached statistical significance ($p < .064$).

Secondary Hypotheses

Secondary Hypothesis 1

This hypothesis predicted that smoking status of the partner would be positively related to the smoking status of the subject at study entry. This was tested using a chi square analysis that partitioned the smoking status of the partner in two ways. The first chi square test compared female quitters/smokers with their partner's status: ex-smoker, current smoker, or nonsmoker. This chi square was nonsignificant (chi square=.46, $df=2$). In a second test, nonsmokers and ex-smokers were combined whereas current smokers comprised the second category. This chi square was also nonsignificant (chi square=.009, $df=1$). Secondary hypothesis 1 was rejected.

TABLE 17
HIERARCHICAL REGRESSION OF
SMOKING STATUS AT TIME OF THIRD TRIMESTER FOLLOW-UP ON:
SELF EFFICACY, PARTNER SUPPORT, MATERNAL ADAPTATION, AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Number of cigarettes at entry	.70	.10	.70	<.001
$R^2 = .50$ (F=49.32 df=1,50)				
<u>Step 2:</u>				
General	-.23	.11	-.21	<.03
Reorder	-.12	.10	-.11	ns.
Feeling	-.02	.12	-.02	ns.
Efficacy	.09	.12	.07	ns.
Support	-.28	.11	-.24	<.01
R^2 change=.10 (F=2.26 df=5,45)				ns. (.06)
R^2 total=.60 (F=11.14 df=6,45)				<.001
<u>Step 3:</u>				
Interactions of main effects				
R^2 change=.06 (F=1.08 df=6,39)				ns.
R^2 total=.65 (F=6.16 df=12,39)				<.001
<u>Step 4:</u>				
Interactions of covariates with main effects				
R^2 change=.05 (F=1.03 df=5,34)				ns.
R^2 total=.70 (F=4.67 df=17,34)				<.001

Secondary Hypothesis 2

Hypothesis 2 stated that women with lower levels of partner support during their pregnancy and a greater amount of stress (both assessed at third trimester follow-up), would be less successful at reducing than women with more support and less stress. Smoking status in the third trimester served as the dependent measure in this analysis.

A hierarchical regression was used to test this hypothesis. The covariate of smoking level at study entry was entered in the first step. This was followed by the main effects of partner support and a composite score of stress experienced during pregnancy. The interaction of these two variables was entered in the third step followed by the set indexing covariate assumptions.

As illustrated in Table 18, covariate assumptions were supported and the two-way interaction between main independent variables was nonsignificant. Variance accounted for by the set of main effects was significant ($p < .03$), in which partner support was responsible for essentially all of the change in R^2 (7%).

These findings would suggest that smoking status in the third trimester is influenced by the behavior of a woman's partner though not necessarily by the amount of perceived life stress. Only partial support was found, therefore, for this secondary hypothesis and alternative explanations will be considered in the discussion.

To further examine the specific components of partner support helpful in promoting reduction among smokers, an adjunct analysis was conducted using the four clusters of support derived from a subject's retrospective assessment of partner support. Mermelstein et al., (1983a) had found a trend in their data for partners who were smokers to express more support of their spouses' attempts to

TABLE 18
HIERARCHICAL REGRESSION OF
SMOKING STATUS AT TIME OF THIRD TRIMESTER FOLLOW-UP ON:
STRESS, PARTNER SUPPORT, AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Number of cigarettes at entry	.70	.10	.70	<.001
$R^2 = .50$ (F=49.32 df=1,50)				<.001
<u>Step 2:</u>				
Stress	-.01	.09	-.01	ns.
Partner support	-.28	.10	-.26	<.009
R^2 change=.07 (F=3.67 df=2,48)				<.032
R^2 total=.56 (F=20.64 df=3,48)				<.001
<u>Step 3:</u>				
Interactions of main effects	.45	.63	.07	ns.
R^2 change=.00 (F=.51 df=1,47)				ns.
R^2 total=.57 (F=15.46 df=4,47)				<.001
<u>Step 4:</u>				
Interactions of covariates with main effects				
R^2 change=.02 (F=1.05 df=2,45)				ns.
R^2 total=.59 (F=10.68 df=6,45)				<.001

abstain than nonsmoking partners. This adjunct analysis investigated two aspects of support; the specific types of support important in smoking modification, and the role of the partner's smoking status.

A multiple regression analysis of covariance was performed on the group of smokers at study entry ($n=52$). Reported number of cigarettes smoked/day at entry were covaried out on the first step. Specific types of support were entered on the second step followed by partner smoking status in step three. The set of two-way interactions testing partner support status by specific types of support comprised the fourth step with step five consisting of the check of covariate assumptions.

The results in Table 19 indicate that specific types of partner support were statistically related to smoking outcome ($p<.03$). As a set, partner behaviors accounted for 9.8% of the outcome variance. Within this set, nagging was the only statistically significant cluster ($p<.05$), explaining 3.6% of the residual variance. Policing and positive reinforcement, though not statistically significant in their univariate relationship with outcome, explained the second and third largest amount of variance (both approximately 1.7%). The direction of these two clusters, however was reversed. Policing was positively related with the reported number of cigarettes smoked indicating that a higher amount of policing behavior was associated with more smoking. In both cases of nagging and positive reinforcement, this relationship was negative; a greater amount of support was associated with less smoking.

TABLE 19

75a

HIERARCHICAL REGRESSION OF
SMOKING STATUS AT TIME OF THIRD TRIMESTER FOLLOW-UP ON:
PARTNER SUPPORT CLUSTERS, PARTNER SMOKING STATUS, AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Number of cigarettes at entry	.70	.10	.70	<.001
$R^2 = .50$ (F=49.32 df=1,50)				<.001
<u>Step 2:</u>				
Policing	.18	.13	.13	ns.
Reinforcement	-.22	.16	-.13	ns.
Cooperation	-.06	.15	-.04	ns.
Nagging	-.26	.13	-.19	<.04
R^2 change=.10 (F=2.79 df=4,46)				<.03
R^2 total=.59 (F=13.51 df=5,46)				<.001
<u>Step 3:</u>				
Partner smoking status				
R^2 change=.01 (F=1.64 df=1,45)				ns.
R^2 total=.61 (F=11.69 df=6,45)				<.001
<u>Step 4:</u>				
Interactions of main effects				
R^2 change=.06 (F=1.79 df=4,41)				ns. (.15)
R^2 total=.67 (F=8.22 df=10,41)				<.001
<u>Step 5:</u>				
Interactions of covariates with main effects				
R^2 change=.03 (F=.66 df=5,36)				ns.
R^2 total=.70 (F=5.47 df=15,36)				<.001

Secondary Hypothesis 3

Hypothesis 3 examined the relationship between self efficacy expectations and behavioral intention (both predicting third trimester smoking behavior). The subset of 52 smokers at study entry served as the subject pool. To test this association, a Pearson correlation was performed between Conditotte and Lichtenstein's self efficacy scale and single item behavioral intention question from the Background Questionnaire. The two variables were highly correlated ($r=.43$, $p<.001$, $n=51$), confirming this hypothesis.

Secondary Hypothesis 4

In order to evaluate the strength of efficacy and intention as a predictor of third trimester smoking status ($n=52$), a multiple regression solution was selected as most appropriate. Variance due to smoking at study entry could be removed from the residual variance, leaving the remaining to be accounted for by main effects. The results from two multiple regression models were compared to evaluate the relative effect size of the two predictor variables entered in reverse order. Table 20 presents the variance accounted for by behavioral intention entered first followed by self efficacy. In the right-hand column, the results of reverse entry are presented. Once the covariate had adjusted the outcome measure of the reported number of cigarettes smoked/day in third trimester, efficacy accounted for a greater amount of residual variance regardless of its entry position. In both cases, the predictive strength of either efficacy or behavioral intention was unimpressive. Weak support, therefore, was found for this secondary hypothesis.

TABLE 20

A COMPARISON OF HIERARCHICAL REGRESSIONS OF SMOKING STATUS AT TIME OF THIRD TRIMESTER FOLLOW-UP ON:
SELF EFFICACY, BEHAVIORAL INTENTION, AND COVARIATES

Predictor Variable	Beta	S.E. Beta	Semi-Partial Correlation	p	Predictor Variable	Beta	S.E. Beta	Semi-Partial Correlation	p
<u>Step 1:</u>					<u>Step 1:</u>				
Number of cigarettes at entry	.70	.10	.70	<.001	Number of cigarettes at entry	.70	.10	.70	<.001
R ² = .50 (F=49.32 df=1,50)					R ² = .50 (F=49.32 df=1,50)				
<u>Step 2:</u>					<u>Step 2:</u>				
Behavioral intention	-.03	.12	-.03	ns.	Self efficacy	.06	.12	.05	ns.
R ² change = .000 (F=.08 df=1,49)				ns.	R ² change = .002 (F=.28 df=1,49)				ns.
R ² total = .50 (F=24.24 df=2,49)				<.001	R ² total = .50 (F=24.45 df=2,49)				<.001
<u>Step 3:</u>					<u>Step 3:</u>				
Self efficacy	.07	.12	.06	ns.	Behavioral intention	-.04	.12	-.04	ns.
R ² change = .003 (F=.34 df=1,48)				ns.	R ² change = .001 (F=.14 df=1,48)				ns.
R ² total = .50 (F=16.06 df=3,48)				<.001	R ² total = .50 (F=16.06 df=3,48)				<.001 ^a

Secondary Hypothesis 5

Another secondary hypothesis predicted that the behavioral factors of self efficacy and partner support would show a larger effect size than the variable indexing health knowledge in predicting smoking behavior. The strategy used to test this hypothesis was similar to the previous set of analyses. Two multiple regression runs were performed, one with the behavioral factors entered as a set followed by the variable representing extent of health knowledge; and a second analysis with this order reversed. Once again, the covariate, reported number of cigarettes smoked/day at entry, was first entered to adjust the outcome score. Number of tobacco-related fetal effects reported by the woman was entered in the second step, and efficacy together with partner support comprised the third. The second regression reversed the entry of the last two steps.

Results in Table 21 confirm this secondary hypothesis. Efficacy and support captured more outcome variance in follow-up smoking rates than the variable reflecting knowledge of health risks. This is true in both regression analyses. It is recognized that health knowledge could be measured in a number of ways that might better reflect its conceptual basis. Number of health risks was selected since some interventions using on a health education model have emphasized the variety of risks as opposed to delineating specific physiologic response paths or mechanisms of a particular risk. In other words, one could be aware of only one health risk such as low birth weight, but be very sophisticated about the rate of infant mortality associated with a lower birth weight, or the infant's greater susceptibility to illness and infection because of its reduced size. With this limitation in mind, secondary hypothesis 5 was confirmed with a quantitative definition of health knowledge.

TABLE 21

A COMPARISON OF HIERARCHICAL REGRESSION OF SMOKING STATUS AT TIME OF THIRD TRIMESTER FOLLOW-UP ON:
SELF EFFICACY, PARTNER SUPPORT, HEALTH KNOWLEDGE, AND COVARIATES

Predictor Variable	Beta	S.E. Beta	Semi-Partial Correlation	p	Predictor Variable	Beta	S.E. Beta	Semi-Partial Correlation	p
<u>Step 1:</u>					<u>Step 1:</u>				
Number of cigarettes at study entry	.70	.10	.70	<.001	Number of cigarettes at study entry	.70	.10	.70	<.001
R ² = .50 (F=49.32 df=1,50)				<.001	R ² = .50 (F=49.32 df=1,50)				<.001
<u>Step 2:</u>					<u>Step 2:</u>				
Self efficacy	.03	.12	.02	ns.	Health knowledge	.08	.10	.08	ns.
Partner support	-.22	.11	-.21	<.04	R ² change=.005 (F=.57 df=1,49)				ns.
R ² change=.05 (F=2.36 df=2,48)				ns. (.10)	R ² total=.50 (F=24.73 df=2,49)				<.001
R ² total=.54 (F=18.91 df=3,48)				<.001	<u>Step 3:</u>				
<u>Step 3:</u>					Self efficacy	.03	.12	.02	ns.
Health knowledge	.02	.10	.02	ns.	Partner support	-.22	.11	-.19	<.05
R ² change=.00 (F=.02 df=1,47)				ns.	R ² change=.04 (F=2.03 df=2,47)				ns. (.14) ^a
R ² total=.54 (F=13.90 df=4,47)				<.001	R ² total=.54 (F=13.90 df=4,47)				<.001

Secondary Hypothesis 6

Secondary hypothesis 6 explored the effect of the source of advice to not smoke during pregnancy as well as the number of sources involved in the transmission of this information. It was predicted that friends and relatives would act as a more potent source of information regarding tobacco effects than health providers. Further, it was predicted that women who had received this information from a larger number of sources would be more inclined to refrain from tobacco use than women receiving this information from fewer sources.

To test these complementary hypotheses, a series of chi square analyses were employed for the association between type of source and smoking status of quitter/smoker at study entry. In order to test the relationship between quantity of transmission sources and smoking status, two pearson correlation coefficients were computed; one for smoking status at study entry, and a second looking within the subgroup of smokers at entry. The results from this series of analyses are presented in Table 22.

Although the chi square analysis was significant for friend as a source of information, the relationship was in the opposite direction than predicted. This was also true for health providers. Tests of association revealed that smokers were more likely to report being told by friends and health care workers about the dangers than quitters. In retrospect, these data are easily understood given the current smoking behavior of the two groups. Quitters would be less likely to be told by others to not smoke during pregnancy since they had already abandoned the habit. Women continuing to smoke, on the other hand, would be a more likely target for health professionals to remind or inform them to not smoke. It is not clear whether this finding was due to the time of questionnaire administration

TABLE 22
RELATIONSHIP BETWEEN SOURCE OF HEALTH INFORMATION (TYPE AND NUMBER)
AND SMOKING STATUS

Chi square analyses for type of source by entry smoking status*:

<u>Source</u>	<u>Test</u>	<u>df</u>	<u>p</u>
Friend	chi square= 3.71	1	p<.054
Relative	chi square= 1.34	1	ns.
Health Provider	chi square=13.60	1	p<.0002

Pearson correlation coefficients for Number of Sources
by smoking behavior:

	<u>Test</u>	<u>p</u>	
Smoking status* at entry:	r= +.249	p=.014	<u>n</u> =78
Third trimester level of smoking:	r= +.043	ns.	<u>n</u> =49

*Smoking status is coded as Quitters=0, and smokers at entry=1.

and memory bias, or if quitting smoking is unrelated to being told to not smoke by others.

Examination of the number of sources with smoking status revealed a similar set of results for smoking behavior at study entry. There was a significant positive association between the number of sources and smoking status where smoking was scored in the higher direction. In other words, smokers reported receiving the message to not smoke from a greater number of outside sources than quitters. In the case of women reporting themselves as smokers at study entry, there was no relationship between the number of sources of information and subsequent changes in their smoking behavior. Therefore, this secondary hypothesis was disconfirmed in the case of smokers, and in the opposite direction than predicted for quitters/smokers at study entry.

Secondary Hypothesis 7

The role of personal susceptibility to tobacco related complications was examined in this hypothesis. A significant negative association between one's sense of susceptibility and smoking behavior was predicted. This question was tested using a multiple regression model for the two groups of subjects: quitters/smokers, and the subgroup of smokers at entry. Personal susceptibility was measured by two items, the woman's report of symptoms and effects experienced from her smoking, and an interviewer rating reflecting perceived susceptibility to tobacco related complications during pregnancy. Interviewer ratings were based on a variety of comments. For example, women volunteering that their mother smoked, their sister and best friend smoked while pregnant and none of them had "sick babies", would be given a score of "little perceived risk". On the other hand, women

who reiterated a gut level instinct that "smoking was bad for the baby" without contradicting themselves in other parts of the interview with familial counter-evidence would be rated as "personally susceptible".

In the first analysis, smoking status at entry served as the binary outcome and covariates consisted of smoking level prior to pregnancy and SES. Globally judged susceptibility and personal symptoms were entered together as a set followed by a third set of covariate assumption tests. Results given in Table 23 indicate that the main effects accounted for 15% of the outcome variance in smoking status at study entry. Within this set, the judgment of susceptibility was associated in the hypothesized direction with outcome ($p < .0004$), explaining 12.5% of the set's variance. Personal symptoms accounted for 1.8% of the variance and was nonsignificant.

Regression results for smokers at entry are presented in Table 24. Compared to the sample as a whole, perceived susceptibility played no role in predicting changes in smoking behavior over the course of pregnancy. As a set, global judgment and personally experienced symptoms accounted for only .89% of the variance.

Support for this hypothesis was therefore divided. Personal susceptibility predicted group membership (quitter/smoker) at entry suggesting that it may have played an important role in promoting cessation. However, within the group of smokers at entry, perceived susceptibility was not related to a reduction in smoking over the course of pregnancy.

Additional analyses were performed to investigate the impact of previous complications and parity on smoking behavior. It was believed that multiparous women with previous obstetrical complications would be more inclined to see

TABLE 23

HIERARCHICAL REGRESSION OF SMOKING STATUS AT STUDY ENTRY ON:
PERCEIVED SUSCEPTIBILITY, SYMPTOMS, AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Prior number of cigarettes	.27	.11	.26	<.012
SES	.40	.11	.38	<.001
$R^2 = .18$ (F=8.45 df=2,75)				<.001
<u>Step 2:</u>				
Judged susceptibility	.36	.10	.35	<.001
Symptoms	-.14	.10	-.13	ns.
R^2 change=.15 (F=8.51 df=2,73)				<.001
R^2 total=.34 (F=9.32 df=4,73)				<.001
<u>Step 3:</u>				
Interactions of covariates with main effects				
R^2 change=.03 (F=.85 df=4,69)				ns.
R^2 total=.37 (F=5.05 df=8,69)				<.001

TABLE 24
HIERARCHICAL REGRESSION OF
SMOKING STATUS AT TIME OF THIRD TRIMESTER FOLLOW-UP ON:
PERCEIVED SUSCEPTIBILITY, SYMPTOMS, AND COVARIATES

<u>Predictor Variable</u>	<u>Beta</u>	<u>S.E. Beta</u>	<u>Semi-Partial Correlation</u>	<u>p</u>
<u>Step 1:</u>				
Number of cigarettes smoked at entry	.70	.10	.70	<.001
$R^2 = .50$ (F=49.33 df=1,50)				<.001
<u>Step 2:</u>				
Judged susceptibility	-.03	.10	-.03	ns.
Symptoms	.10	.11	.09	ns.
R^2 change=.01 (F=.43 df=2,48)				ns.
R^2 total=.51 (F=16.36 df=3,48)				<.001
<u>Step 3:</u>				
Interactions of covariates with main effects				
R^2 change=.00 (F=.04 df=2,46)				ns.
R^2 total=.51 (F=9.43 df=5,46)				<.001

themselves as personally susceptible and hence, quit smoking during the next pregnancy than women without previous difficulties. Of the 26 women who reported themselves as quitters at entry, 41% were primiparous and 24% multiparous. A chi square analysis was performed on the subgroup of 37 multiparous subjects to test the association of smoking status at entry (quitter/smoker) to previous complications. Although the chi square was nonsignificant (chi square=2.07, df=1, p=.14), there were twice as many women without prior complications who had quit smoking for this pregnancy(36%) as there were women with prior complications deciding to quit (11%).

Exploratory Hypotheses

Exploratory hypotheses examined the association between projective test data and one of two outcomes; smoking status and maternal adaptation. Pearson correlation coefficients were computed to test the strength of association between these variables. Presented in Table 25 are exploratory hypotheses 1,2 and 3. There was a nonsignificant relationship between a woman's TAT response that included a cigarette and her smoking status at study entry. Further, none of the maternal adaptation factors was found to be significantly related with a TAT response describing an ambiguous female figure as pregnant nor the inclusion of an infant in response to a family stimulus card. In summary, none of these exploratory hypotheses was confirmed.

Examination of smoking strategies comprised the final area of exploratory hypothesis testing. Four analyses were performed to test 1) the kinds of strategies that discriminated quitters from smokers, 2) the types of strategies correlated with reduced smoking at follow-up, 3) the relationship of the number of

TABLE 25
CORRELATIONS OF TAT RESPONSES
WITH MATERNAL ADAPTATION FACTORS AND THIRD TRIMESTER SMOKING^a

	<u>General</u> <u>(Factor 1)</u>	<u>Reorder</u> <u>(Factor 2)</u>	<u>Affect</u> <u>(Factor 3)</u>	<u>3rd Trimester</u> <u>(Factor 4)</u>
Cigarette included (TAT 1)	-.21 (.07)	-.01 (.48)	-.19 (.13)	-.12 (.26)
Figure seen as pregnant (TAT 3)	-.02 (.48)	.07 (.32)	.11 (.24)	-.07 (.35)
Infant included (TAT 6)	.07 (.31)	.19 (.10)	.21 (.10)	.09 (.31)

CHI SQUARE ANALYSES OF TAT RESPONSES BY ENTRY SMOKING STATUS*

<u>Item</u>	<u>Test</u>	<u>df</u>	<u>p</u>
1. TAT 1 Cigarette	chi square=.61	1	ns.
2. TAT 3 Pregnant figure	chi square=.35	1	ns.
3. TAT 6 Infant	chi square=.75	1	ns.

^aN=54 with deletion of missing data. N ranged from 54 to 33.

*Smoking status is coded as Quitters=0, smokers at entry=1.

Note: p values in parentheses ().

strategies used to entry smoking status, and 4) the correlation between the number of strategies used and third trimester smoking status. It was predicted that women who possessed several strategies to avoid tobacco use would be more successful in reducing/abstaining than women with fewer strategies. Results from these analyses are presented in Table 26. Significant chi square results were found for three of the five most frequently used strategies by quitters. These included two cognitive strategies reflecting a strong sense of will power, and mental reminders of the fetal effects, and the feeling of nausea that provided an off-taste and smell to tobacco. In all cases, quitters were more likely to use these strategies than smokers. Environmental strategies such as partner support and not purchasing cigarettes were not associated as a strategy used by one group more than another. However, within the group of smokers at entry ($n=52$), both partner support and spacing or counting the number of cigarettes smoked per day were significantly correlated with lower levels of tobacco use.

Finally, the number of strategies mentioned by a woman as her coping plan to reduce or avoid cigarettes was correlated with smoking status at entry and at follow-up. The quantity of strategies was related to smoking status in the direction of the hypothesis. Quitters reported more strategies to avoid smoking than nonquitters ($r=-.33$, $p=.002$). This was also true for the continuous outcome measure of cigarettes smoked at follow-up. Women with fewer strategies were more likely to be smoking a greater number of cigarettes in their third trimester than subjects reporting coping plans at entry ($r=-.26$, $p<.035$).

TABLE 26

RELATIONSHIP BETWEEN COPING STRATEGIES (TYPE AND NUMBER) AND SMOKING STATUS

Type of strategy used to avoid smoking:

	<u>Test</u>	<u>Outcome</u>	<u>p</u>
1. Will power	chi square= 4.21 df= 1	quitter/smoker at entry	<.04
Will power	pearson corr= -.04	number of cigarettes in third trimester	ns.
2. Think about fetal effect	chi square=10.41	quitter/smoker at entry	<.001
Think about fetal effect	pearson corr= -.13	number of cigarettes in third trimester	ns.
3. Nausea	chi square= 9.56	quitter/smoker at entry	<.002
Nausea	pearson corr= -.18	number of cigarettes in third trimester	ns.
4. Partner	chi square= .67	quitter/smoker at entry	ns.
Partner	pearson corr= -.33	number of cigarettes in third trimester	<.01
5. Does not buy	chi square= .85	quitter/smoker at entry	ns.
Does not buy	pearson corr= -.18	number of cigarettes in third trimester	ns.

Number of strategies by smoking status:

	<u>Test</u>	<u>p</u>
1. Smoking status at entry (quitter/smoker)	r= -.33	<.002
2. Third trimester smoking behavior	r= -.26	<.03

Descriptive Findings

Listed in Table 27 were the most frequently named health risks associated with smoking according to study participants. Although 67% of the sample reported low birth weight as a tobacco related risk, one third of these women did not understand its implications. In fact, several commented that a smaller infant would be easier to deliver.

Table 28 contains sample responses to two questions; "Which one cigarette would be (or was) the most difficult to give up?", and "What type of program would you have found helpful in strengthening your efforts to reduce/quit?" Smokers were much more inclined to name the cigarette following meals as most difficult whereas quitters had the most difficulty resisting cigarettes under stressful situations. Responses to program preferences revealed that smokers in the third trimester would be most interested in attending a smoking cessation group with other pregnant women.

Quitters at the time of follow-up were asked about their plans in the future regarding smoking. Most of the women (80%) stated that they would not resume smoking following delivery, while 7% did not have plans, and 14% predicted smoking immediately after the birth or following weaning.

MOST FREQUENTLY CITED PREGNANCY COMPLICATIONS
AND FETAL EFFECTS CAUSED BY TOBACCO USE

	<u>n</u>	<u>(%)</u>
1. Low birth weight	52	67*
2. Vasoconstriction of fetal oxygen supply ^a	23	29
3. Increased susceptibility to illness	10	13
4. Birth defect/congenital malformations	9	11
5. Preterm labor	9	11
6. Central nervous system damage in the fetus ^b	8	10
7. Learning disability	6	8
8. Sudden infant death syndrome	4	5
9. Circulation damage in the fetus ^b	3	4
10. Spontaneous abortion	1	1

I don't know	9	12

Mean number of complications cited = 1.808 S.D.=1.249 N=78

^aDescribed most often as the baby can't breath, or the baby suffocating.

^bNo known permanent damage caused by tobacco smoke to this system has been documented.

*33% of these subjects did not understand why low birth weight was considered a complication.

TABLE 28

DESCRIPTIVE FINDINGS RELATED TO TOBACCO USE

A. Most difficult cigarette to give up?		<u>Quitters (%)</u>	<u>Smokers (%)</u>	
1.	Cigarette in a stressful situation.	.29	.34	
2.	Cigarette in a social situation.	.19	.07	
3.	Cigarette with a meal.	.13	.42	
4.	Other (please specify).	.13	.02	
5.	First cigarette in the morning.	.10	.15	
6.	None would be difficult.	.16	0	
B. Intervention Preferences Expressed by Sample		<u>Total (Ranked Preference)</u>	<u>Quitters (%)</u>	<u>Smokers (%)</u>
1.	Cessation group with other pregnant women.	1	.14	.26
2.	Receive written materials.	1	.29	.19
3.	Would prefer no intervention.	3	.24	.15
4.	Cessation group with partner.	4	.14	.19
5.	Self help kit to stop smoking.	5	.05	.18
6.	Special opportunity to discuss with M.D.	6	.14	.03
7.	Missing (number).	(13)	(8)	(5)

DISCUSSION

Study results suggest that factors influencing initial smoking cessation at the time of pregnancy confirmation are different from variables producing change over the course of gestation. Generally speaking, women quitting in the first trimester remained abstinent throughout their pregnancies; only three women relapsed. On the other hand, smoking behavior for subjects not abstinent in the first trimester was not uniform within the sample. Some women increased their consumption during pregnancy (perhaps after initial nausea subsided), several became quitters by third trimester, and many made no changes in the reported number of cigarettes smoked each day.

It was not anticipated that changes in smoking behavior would be confined to one group of participants (i.e., that there would be so little variance in the later behavior of early quitters). This posed some limitations since it was not feasible to analyze quitters and smokers as one pool. By dividing the sample, however, the power for some statistical tests was diminished. Findings in these cases therefore, will be considered exploratory in this discussion.

Self Efficacy

The characteristic that overwhelmingly differentiated quitters from smokers in the first trimester was self efficacy. As mentioned earlier, this construct when measured by Condiotte and Lichtenstein's Confidence Questionnaire, reflects a behavioral assessment of confidence that one can resist smoking in a particular situation. Given that quitters had the opportunity to practice resisting, and had experienced success in their attempts, it is not surprising that self efficacy accounted for 35% of the variance in group membership. This finding parallels results from behavioral treatment research in that self efficacy expectations of successful quitters are higher after treatment and remain elevated through three to six month follow-ups than efficacy levels in treatment failures.

A second measure of efficacy, Brod's Self Efficacy Assessment scale was substituted in an adjunct analysis to determine its relationship to smoking status in the first trimester. Supportive results were also obtained using this instrument that is less dependent on behavioral performance. This scale measures the importance of quitting, the amount of stress posed by quitting, the number of models (successful quitters) present in one's network, and the belief that one exerts some control over his/her environment. High levels of self efficacy were more prevalent among quitters than smokers at entry, and accounted for 15% of outcome variance.

Since these analyses were correlational and thus not predictive of subsequent behavior, causal inferences concerning the role of self efficacy and smoking status cannot be drawn. It is unclear for example, whether higher levels of self efficacy promoted initial cessation in quitters, or if elevated expectations were achieved in the weeks following successful nonsmoking. A stronger test of effi-

cacy would require that expectations be assessed at an earlier time (e.g., before the woman quit smoking, perhaps before the pregnancy is just confirmed), and correlated with subsequent smoking behavior.

There is still the remaining possibility that a third, unknown factor produced initial differences in efficacy expectations. Significant correlations suggest that smokers and quitters at study entry varied on a number of factors such as SES, education, number of years smoked, and nicotine content. It is possible that these subject characteristics played a role in forming efficacy expectations independent of the confirmation of pregnancy and also influenced quitting.

Somewhat surprising was the fact that efficacy expectations had a negligible impact on smoking reduction over the course of pregnancy. Instead, continued smokers were influenced by their initial smoking level and other significant covariates such as number years smoked, parity, and nausea.

Although self efficacy accounted for a somewhat greater amount of variance in third trimester smoking than behavioral intention, both variables were poor predictors of outcome. It is difficult to speculate why these variables showed so little relationship to subsequent behavior. Some continued smokers spoke of guilt they experienced with their smoking. Perhaps as in Marlatt and Gordon's relapse model, guilt served as an inhibitor to future attempts to abstain. Since subjects were not exposed to an intervention to aid in modifying tobacco use, there was no structured program supportive of change that would increase one's sense of efficacy. Efficacy expectations may be more important to the process of change if women are given systematic means to achieve reduction. In the past, an improvement in expectations over the course of treatment has been observed in non-pregnant populations (see Introduction). This question should be examined in fu-

ture studies to determine whether efficacy expectations operate in a similar manner in pregnant women undergoing behavioral treatment programs as in the general population.

Partner Support

The facilitating influence of partner support on modifying smoking was investigated from a number of perspectives. Variables reflecting perceived helpfulness of partner behavior, partner's smoking behavior, and the availability of partner support as a coping strategy were considered in several analyses. Contrary results were obtained for the two study groups. Partner support appeared to have no influence on the initial decision to quit, whereas the role of the partner exerted a moderate effect on altering a woman's smoking over the course of pregnancy.

The key measure of partner support in this study was Mermelstein et al.'s (1983) Partner Interaction Questionnaire. One advantage of this scale is that it allows subjects to evaluate each behavior as being helpful or unhelpful. For example, it is not assumed that having one's partner compliment her for not smoking is experienced as supportive in cutting back. In this research, an interaction was found between partner support and ethnic group. Support received by non-white women was significantly associated with reduction whereas partner support for Caucasian subjects did not enhance reduction. This was an interesting finding that was unexpected and deserves closer examination and replication in future research.

In other analyses of partner support also using the first trimester assessment to predict smoking in the third trimester, statistical significance was not

achieved because of the reduced sample size. However, the results were in the expected direction and allows determination of the sample size needed to establish a significant relationship. For example, in the case of an adjunct regression exploring particular dimensions of support by ethnicity of a partner, a sample size of 78 would have been adequate to detect a statistically significant effect with a power of .80. The test of main Hypothesis 3, partner support along with two maternal adaptation factors accounted for 10% of the outcome variance in third trimester smoking status. This effect would have been statistically significant had the sample included six additional subjects.

A second finding that supported the role of the partner in reduction was the significant correlation between naming one's partner as a coping strategy to avoid cigarettes and subsequent smoking behavior. It was of interest to note that partner support as a strategy was not named more frequently by quitters than smokers at study entry. However, within the group of smokers at entry, the use of the partner as a strategy was significantly related to lower smoking levels in the third trimester.

In addition, it was found that retrospective reports of partner support over the course of pregnancy were important to tobacco reduction. In particular, the results indicated that although stress experienced over the course of gestation did not influence third trimester smoking rates, partner support was significantly associated to outcome. Women who reported receiving a greater amount of support were more likely to report a reduction in the number of cigarettes smoked at follow-up than women with less support. Surprisingly, nagging by the partner was the strongest determinant of outcome. Positive reinforcement exerted a small effect on reduction and partner policing behavior was counter productive.

It could be argued that these retrospective reports may reflect a tendency for women successful in reducing to report more support than women not able to change. Although this alternative explanation cannot be ruled out, prospective analyses including the use of a partner as a coping strategy, and the significant interaction between ethnicity and partner support lend some support to the hypothesis that partner behavior is a facilitator to cigarette reduction.

Partner support must be active if it is to influence the spouse. In other words, the mere presence of a smoking partner in the house was not related to a woman's smoking behavior. Nor was a nonsmoker more influential in promoting reduction in his partner. This differs from findings of earlier studies that reported marital pairs do not typically change their smoking behavior independently of one another. It suggests that the dynamics of pregnancy may be somewhat different. Once the period of pregnancy ends, it may be that long term maintenance of behavior change will be altered by the presence of a smoker (or nonsmoker) in the immediate environment. The smoking behavior of both individuals following birth equally affect the infant. Subjects would need to be followed for an extended period of time after delivery in order to determine if the relapse rate is greater in women with smoking partners than in women living with nonsmokers.

Maternal Adaptation

Results concerning maternal adaptation were interesting for two reasons: 1) there was a suppression effect for maternal adaptation revealed in the analyses, and 2) the factors comprising maternal adaptation, General, Reorder, and Affect had a differential impact on the smoking behavior for the two study groups.

The results in this study are suggestive of a fairly minimal effect of maternal adaptation in enhancing smoking reduction over the course of pregnancy. It should be noted that when comparing the results from Hypothesis 2 (maternal adaptation factors considered alone) and Hypothesis 3 (behavioral variables and maternal adaptation factors), the outcome variance accounted for by maternal adaptation is larger when entered with the variables of self efficacy and partner support than when examined by itself. This suggests a suppression effect indicating that maternal adaptation is correlated with the behavioral variables, and that by adding efficacy and support, irrelevant error variance is removed.

A second finding of interest (considered more exploratory) was that the General factor of maternal adaptation was positively correlated with smoking reduction over the period of gestation for the 52 smokers in the first trimester. This factor, reflecting the timing and planning of pregnancy, a woman's response to pregnancy confirmation, and the interviewer's global judgment, accounted for 4.2% of the variance. As mentioned earlier, Hypothesis 3 findings indicate that a reduction in smoking may be associated with partner support and maternal adaptation. Together, these variables explained 10% of the residual variance in follow-up smoking behavior though did not reach statistical significance. These findings lend some support to the premise that women with higher levels of maternal feelings may be more motivated to alter their smoking during pregnancy.

In contrast to the results found for smokers, maternal adaptation factors of Reorder and Affect indexing changes in a woman's relationship with self, partner, and parents were significantly associated with whether a woman had quit or was smoking in the first trimester. Each explained 2.4% of the outcome variance. Unexpectedly, these two factors were negatively related to outcome. Smokers

had higher scores on Reorder and Affect than quitters at entry indicating that smokers may have lower expectations regarding changes in their personal relationships during pregnancy than quitters. The size of this effect, however, was not large and may not be clinically relevant.

Although the effect of this construct was the smallest of the three main variables (accounting for 3 to 4% of variance), it was also the most difficult to measure. Earlier contributors to the study of maternal adaptation were interested in both conscious as well as unconscious processes. Accurately quantifying intuitive constructs such as this has been a common problem of clinical researchers. The present data are no exception. It should be recalled that categories for two key interview items (i.e., a woman's sense of her maternal capability/image, and the rater's judgment of her feelings toward the pregnancy), had to be modified in order to achieve an adequate standard of inter-rater reliability which reduced the fineness of the differentiations made in maternal adaptation.

The importance of maternal adaptation in fostering smoking reduction may merit re-examination by other researchers. This is suggested because intuitively the hypothesis relating one's feelings toward the fetus to health care-taking behaviors during pregnancy is appealing. The measurement of this construct is problematic due to its theoretical underpinnings and the need to consider unconscious processes. Findings from this research would suggest that items related to a woman's sense of timing, planning and her initial feelings toward confirmation may be more important indicators of adaptation than reported changes in role relationships and feelings about these changes. Finally, it would also be beneficial to use a much larger sample size and to include the examination of partner support in testing the role of maternal adaptation in smoking reduction. Such a de-

sign may clarify the effect size of maternal adaptation and whether it bears a clinically relevant relationship to smoking reduction among pregnant women.

Health Risk and Personal Susceptibility

Ancillary areas of interest in this research were the effects of the woman's perceived level of risk of smoking, sources of information about and attitudes toward tobacco use during pregnancy, and extent of health knowledge regarding the risks of smoking to fetus and mother in smoking status. There were several germane findings gathered in testing these secondary hypotheses.

In general, pregnant subjects were informed by health providers to stop or reduce their smoking. Their level of awareness regarding possible risks, however, was unimpressive. When asked about the dangers of smoking, women named an average of two risks. This figure included incorrect responses (e.g., damage in nerve and circulatory systems), and the naming of low birth weight by women not aware of its implications to the baby's health (for example, some felt that low birth weight simply meant small, and not that the infant may be more prone to illness). Moreover, the extent of health information had no relationship to reduction over the course of pregnancy, or group membership at study entry.

Qualitative data provided some insight into the dynamics of a pregnant smoker's concept of risk posed by smoking. There were three primary cognitive processes that occurred; rationalization, denial, and misconception.

Rationalization was used by the majority of smokers to explain their behavior. The most frequently heard comment given by one fourth of continued smokers to under-rate the harmful effects of smoking was personal experience or previous birthing experiences of smoking relatives. One woman for example

explained, "My mother smoked during her pregnancies. Both my brother and myself were normal birth weight babies. I understand the dangers of smoking to the fetus because I've read about it. That scares me. At the same time, I think here's my mother and she had us and we're okay so it kind of balances out." A multiparous subject commented, "I smoked with my two other pregnancies and other than being small, my daughter was quite small, nothing was wrong with them. They're brilliant, absolutely brilliant. I'd like to cut down, but quitting is out of the question, I think I'd murder my kids or something."

A second trend in interview dialogue was for women to question the validity of informational sources. This is illustrated below in two comments. "I think the real reason that doctors tell you to quit smoking when you're pregnant is because they just don't want you to smoke period." After reading a front page story reporting recent research on congenital malformations and maternal smoking, a second smoker explained, "I just read an article in the Chronicle about birth defects and they were tying cigarette smoking into it, which is a pretty frightening idea. But I just don't know... The Chronicle is not a paper that I would call a bible in terms of information."

Several misconceptions were expressed by smokers that centered on their understanding of low birth weight. Some made comments suggesting, "I wouldn't mind having a smaller baby," "Sounds like small would be better," "I'm heavy so even if I smoke a lot, I'll make up for it and will have a big baby." Another woman who had experienced six miscarriages continued to smoke heavily during a present pregnancy in order to maintain her body's status quo. She commented, "I want to quit after I have the baby. I'm afraid to quit now because of the pressure I already have on me. I'm afraid of any change in my body that could cause a re-

action like coughing (if she quit). In my mind it could cause muscle contractions... and I'm just afraid to do that." In her opinion, her body had grown accustomed to the nicotine from smoking a pack a day over the past ten years, and altering its intake could cause a negative reaction. She did not associate her miscarriages with smoking and stated when asked about fetal effects that she really did not believe there were any.

Some misconceptions were attributed to health providers who, according to several pregnant smokers, had explained there was evidence of smaller birth weights among smoking mothers, but not less healthy babies, or advised that if quitting was going to increase their anxiety, then it would be better to smoke. One woman reported that her midwife told her that she (the midwife) thought of taking up smoking while pregnant in order to have an easier delivery. The validity of these comments taken out of context is difficult to evaluate. It may be that providers give mixed messages to pregnant smokers. On the other hand, it would appear that just as saliency contributes to the tendency to over-rate one's personal experience, a selective bias may take place if one's health provider has diminished the risks of tobacco use. Any comment downplaying the seriousness of the evidence linking birth complications and smoking may more likely be retained by pregnant smokers than five potential risks also mentioned in the same clinic visit.

This possibility of a retention bias could be studied in a number of patient groups (e.g., hypertensives, myocardial infarct adults, pregnant smokers), to understand its effect of information processing of threatening material. This could be accomplished by exposing one group to a mixed message that would include serious potential risks as well as a provider's brief comment that not all patients

would experience these negative outcomes. The control group would receive only the serious potential risk information. Several days later the patients would be asked to name the known risks and the likelihood in their opinion that these would personally affect them. I would hypothesize that patients in the experimental group would be less vigilant about their preventive health behavior than control subjects.

Perceived susceptibility as assessed by interview comments was found to be a prominent characteristic differentiating smokers from quitters at study entry. Second only to efficacy, this variable explained 15% of variance at entry yet had little impact on enhancing reduction over the course of pregnancy.

It remains to be determined which variables increase one's perceived susceptibility to a negative outcome, and the relationship of these factors to self efficacy. Previous literature would suggest that often one's sense of susceptibility is increased in smokers (e.g., shortness of breath, morning cough), serving as a prompt for quitting that may bolster a sense of personal mastery or efficacy in successful abstainers. This process may be different for pregnant smokers who do not receive subtle yet repitious cues (e.g., cough), that their smoking is harmful. Instead, the concept of risk for these smokers is completely dependent on longer term consequences. Perhaps with women deciding initially to quit, their sense of coping with nonsmoking (efficacy expectations) accompanies the belief that quitting is important to the health of the fetus (susceptibility). As would be the case with nonpregnant smokers, the rationalization for one's behavior may be preceded by one's confidence that she or he can alter smoking. Theoretically, it would be consistent that self efficacy expectations would be antecedant to cognitions justifying the importance of quitting. In this study the second most frequently

used strategy by quitters to abstain from smoking was mental reminders of the well being of their fetus. This supports the use of perceived risk as a coping tool to reinforce change. As suggested earlier, research focusing on subjects who have just received confirmation of their pregnancy would be beneficial in clarifying the sequence of cognitive events leading to a decision to quit.

Recommendations for a Next Step

One purpose of this dissertation was to explore the dynamics of change in order to propose an efficacious treatment intervention for pregnant smokers. Literature reviewed in the introduction revealed that behavioral interventions, especially those employing aversive techniques have been very effective in producing cessation. Most health care providers, however, would be hesitant to suggest pregnant smokers use such techniques because their effects on the fetus are not known. A second literature focusing on a health education approach has revealed that education alone is not sufficient to enact behavior change in pregnant smokers. The need to develop an effective treatment program is great. Results from the subgroup of pregnant smokers in this study suggest several components that may be pertinent to future program planning. These are given below along with some suggestions that are more speculative for pregnant populations but are based on previous studies with smokers.

Women in the current study reported that a smoking cessation group with other pregnant smokers would have the greatest appeal. This was followed by an equal amount of interest in written materials, a self help kit to quit, and a cessation group with their partners. These preferences were elicited at a time when it was clear that participants would not be expected to take part in an intervention.

These results, especially the endorsement of a cessation program with other pregnant smokers are similar to stated preferences from other studies. In some of those studies, however, smokers did not attend group meetings despite their initial interest in them.

Results from the present study may illuminate why this discrepancy between intention and behavioral outcome occurs. Initial covariate analyses for quitters/smoker statistical tests revealed that smokers had a significantly longer history of smoking, smoked more cigarettes per day, and smoked brands with a higher content of nicotine. All of these variables indicate that continued smokers had a stronger addiction to tobacco than early quitters. In addition to this finding, smokers indicated during the interviews that their habit served a variety of functions including dealing with family and work demands, providing stimulation for long periods of boredom, and inducing a feeling of pleasure for smokers who simply enjoyed smoking.

In short, although women believe that a cessation program would be helpful to them, they may not feel capable to quit at this time and decide to forego the commitment of joining a formal intervention. In order to address this concern of smokers that may account for low attendance rates, as well as maintaining allegiance to the health outcomes of pregnancy, a different approach may be required. This alternative perspective would adopt the goal of 1) smoking reduction for members who feel they are not wanting or able to quit completely (yet may be willing to reduce if given instruction), or 2) abstinence among those viewing pregnancy as an ideal time to quit.

There are two reasons that support providing this choice of goals to pregnant smokers. The first is that there is a dose response relationship between tobacco

intake and several obstetrical complications. Low birth weight for example, is directly affected by the level of smoking as is its associated mortality figures. By reducing the amount smoked to 10 or fewer cigarettes a day (the current recommendation by physicians to women who cannot quit), the pregnancy outcomes for infants will be improved. A second argument in support of reduction as a program goal is that many pregnant smokers, unlike motivated volunteers in behavioral studies, are not interested in quitting at this point in time. Providing behavioral skills training to reduce, however, would offer concrete coping strategies to smoke fewer cigarettes and may also alleviate some of the guilt they may experience in relation to their continued smoking. It is recognized that there may be some shortcomings to this approach. Providing women with the message that some smoking is acceptable but a lot is dangerous may take away the incentive for some to quit completely. The cost-benefit ratio of future treatment approaches will need to be evaluated in order to determine the most effective program that produces significant improvements in obstetrical outcome for the largest number of women.

Several components important to a smoking reduction/abstinence program would include clear information regarding risks, partner involvement/support, behavioral skills training, and the availability of safe aversive methods to interested participants. These are covered below.

Study findings would suggest the need for accurate, consistent information addressing the effects of smoking during pregnancy. This would entail clarifying the meaning of low birth weight, and its implications to an infant's health status. In addition, serious complications such as miscarriage, preterm birth, and SIDS need to be explained to participants as significant clinical risks increased by

smoking. It may be important to explain the notion of risk versus causality, and the issue of control over modifying one's chances of a certain outcome. Memory bias could be discussed in a group format so that 1) women are made aware of possible cognitive distortions and 2) the seriousness of risks reiterated.

In addition to clarifying the relationship between pregnancy outcomes and tobacco smoking, it is suggested that a treatment program teach specific skills to reduce smoking. Afterall, it is well documented that providing a fear message without supporting such information with a concrete plan of action is a wasted effort (Leventhal, 1965; Leventhal, Singer, & Jones, 1965). Behavior change would not be expected to occur based on the cognitive/rational approach of health education alone. Results from this study indicate that both partner support and specific coping strategies to orchestrate change are important assets to reducing smoking during pregnancy.

Partner involvement in tobacco modification could be encouraged by having participants set goals for reduction/abstinence together (with the negotiating skill of a group leader if need be). In addition, it would be important to encourage couples to discuss individually behaviors that the woman found helpful, unhelpful or ineffectual. Through this dialogue, the partner's behavior as a positive strategy in change could be optimized.

Another component salient to fostering reduction in smoking would be to provide behavioral skills training to the pregnant participants. Daily record keeping or confining one's smoking to a certain area are two tips from previous research on smoking reduction that may be beneficial to women wishing to cut back. Positive reward for decreasing smoking may also be important in strengthening one's effort and in increasing self efficacy. Couples could decide on rein-

forcement contingencies together. It was found that women in this research with a greater number of strategies to avoid smoking were more successful in reducing than women who lacked coping skills. Self monitoring techniques including counting or spacing cigarettes were significantly related to reduction in this sample. This might be stressed in a program encouraging a variety of coping techniques.

Although not tested in this research, one may conjecture that heavier smokers may require a more potent intervention such as aversive methods of taste satiation or smoke holding (Orleans, White, & Nagey, Note 12), or closer following with controlled smoking guidelines (Glasgow, Kleges, & Vasey, 1983) than those smoking less than 10 cigarettes a day. These low risk techniques should be made available if resources permit and participants request greater assistance.

Monitoring behavior change, especially if reduction is one goal, could be accomplished by frequent ecolyzer CO readings at prenatal visits. It seems likely that this practice would provide positive feedback and support to participants making successful reductions on the one hand, and as a reminder and prompt to heavy smokers to keep them aware of the consequences of their behavior.

Assuming people will change because someone else thinks they should has never been a markedly successful technique of enacting modification, especially in the case of an addictive behavior like smoking. It is important for professionals interested in the area of smoking during pregnancy to make a concerted effort to 1) carefully and consistently explain the risks, 2) provide concrete suggestions, skills or interventions to help foster this change, and 3) to reinforce progress in the form of reduction as well as abstinence.

Concluding Remarks

Results from this research suggest that characteristics describing successful quitters are different than those predictive of change over the course of gestation. Women who do quit, are from higher SES levels, have lighter smoking histories, and maintain abstinence throughout gestation. They can be described as having high self efficacy expectations to abstain and clearly perceiving the risk of smoking to their fetus. Smokers, on the other hand, are less concerned about their behavior, although many do express a sense of guilt. The majority of women who maintain their smoking seem to deal with their anxieties by denying the seriousness of the risk, questioning the validity of the informational source, or focusing on positive outcomes. Women who are capable of reducing their cigarette smoking are more likely than those who continue or increase consumption to have a supportive partner who engages in active assistance and several strategies readily available to cope with nonsmoking. Maternal feelings held by the woman toward her fetus seem to have a small though not dramatic effect on modifying tobacco use during pregnancy. As a next important step, these results should be applied to developing an effective program responsive to both the pregnant smoker's needs as well as the health and welfare of her infant.

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APPENDICES

APPENDIX A

BACKGROUND INFORMATION

Personal data:

1. Your age _____
2. Your ethnicity (check one)
 - ☐ white latina
 - ☐ white
 - ☐ black
 - ☐ native american
 - ☐ chinese
 - ☐ japanese
 - ☐ filipino
 - ☐ other _____
(please specify)
3. Your partner status (check one)
 - ☐ married, living together
 - ☐ married, living apart
 - ☐ partnered(not married), living together
 - ☐ partnered(not married), living apart
 - ☐ single (not married or partnered)
4. Your occupation _____
5. Partner's occupation _____
6. Your highest level of education
 - ☐ Grade 8 or less
 - ☐ Some high school
 - ☐ High school graduate
 - ☐ Some college
 - ☐ College graduate
 - ☐ College past BA or BS
7. Your partner's level of education
 - ☐ Grade 8 or less
 - ☐ Some high school
 - ☐ High school graduate
 - ☐ Some college
 - ☐ College graduate
 - ☐ College past BA or BS

Pregnancy history

8. Have you given birth before? ☐ yes ☐ no
If yes,
Were there any complications with your previous pregnancy? ☐ yes ☐ no
Please specify what these complications were _____
- Did you smoke during your previous pregnancy? ☐ yes ☐ no
9. Have you felt movement or kicking(quickenings) with this pregnancy yet? ☐ yes ☐ no
10. How much nausea have you experienced with this pregnancy? ☐ none ☐ some ☐ a lot

Cigarette Smoking history

11. How many years have you smoked? _____
12. Before you were pregnant, how many cigarettes a day did you smoke? _____
13. How many cigarettes a day do you smoke now? _____
14. What brand of cigarettes do you most often smoke? _____
15. Does your partner/spouse smoke? ☐ No, he is a nonsmoker
☐ No, but he used to smoke
☐ Yes, he currently smokes
16. Have you ever tried to quit before? ☐ yes ☐ no
If yes, how many times? _____
17. Do you intend to change your smoking habit during this pregnancy? (check one)
☐ I plan to smoke more cigarettes ☐ I plan to smoke my usual amount
☐ I plan to reduce, but not to quit ☐ I plan to quit ☐ I have already quit
18. Has anyone suggested that you stop smoking during pregnancy? ☐ yes ☐ no
If yes, who suggested this (check all answers that apply)
☐ relative ☐ friend ☐ health professional ☐ media ☐ other _____
☐ book/magazine ☐ clergy (please specify)

APPENDIX B

Below is a list of statements. Please read each one carefully and then circle the number to the left of the statement which most accurately describes HOW YOU FEEL ABOUT YOURSELF. If, for example, you were asked how uncomfortable you are likely to be around smokers and you feel you are likely to be somewhat uncomfortable, then you would circle 2. If you felt very uncomfortable, however, you would circle 4.

Not at All	Somewhat	Moderately	Very	Extremely	
1	2	3	4	5	How important is it to you to quit smoking during your pregnancy?
1	2	3	4	5	To what degree do you believe you are capable of quitting now?
1	2	3	4	5	How confident are you that you can quit smoking during your pregnancy?
1	2	3	4	5	How difficult do you think it is for you to quit smoking now?
1	2	3	4	5	In general, do you consider yourself a person who succeeds at what they try to do?
1	2	3	4	5	When you are successful, how much do you feel it is because you did something to make it happen (rather than it just happened to you)?
1	2	3	4	5	How stressful do you think quitting smoking is for you?
1	2	3	4	5	To what degree do you think stress affects your behavior?
1	2	3	4	5	How tense or uncomfortable do you feel when you think about quitting?
1	2	3	4	5	To what extent do you need help or outside "aids" to quit smoking?
1	2	3	4	5	To what degree do you have people or a person who is encouraging you to quit?
1	2	3	4	5	In general, how healthy do you consider yourself?
1	2	3	4	5	How many people do you know who have tried to quit smoking? _____ (give number)
1	2	3	4	5	How successful have they been, in general?
1	2	3	4	5	How like these people who have succeeded are you?
					How many people have you known who have smoked while they were pregnant? _____ (give number)
					How many of these women tried to quit? _____ (give number)

In hindsight, do any of the women who continued smoking during their pregnancy wished they had been able to quit? _____ yes _____ no _____ don't know

Below is a list of statements. Please read each one carefully and then circle the number to the left of the statement which most accurately describes HOW YOU FEEL ABOUT YOURSELF. If, for example, you were asked how uncomfortable you are likely to be around smokers and you feel you are likely to be somewhat uncomfortable, then you would circle 2. If you felt very uncomfortable, however, you would circle 4.

Not at All	Somewhat	Moderately	Very	Extremely	
1	2	3	4	5	How important is it to you to quit smoking during your pregnancy?
1	2	3	4	5	To what degree do you believe you are capable of quitting now?
1	2	3	4	5	How confident are you that you can quit smoking during your pregnancy?
1	2	3	4	5	How difficult do you think it is for you to quit smoking now?
1	2	3	4	5	In general, do you consider yourself a person who succeeds at what they try to do?
1	2	3	4	5	When you are successful, how much do you feel it is because you did something to make it happen (rather than it just happened to you)?
1	2	3	4	5	How stressful do you think quitting smoking is for you?
1	2	3	4	5	To what degree do you think stress affects your behavior?
1	2	3	4	5	How tense or uncomfortable do you feel when you think about quitting?
1	2	3	4	5	To what extent do you need help or outside "aids" to quit smoking?
1	2	3	4	5	To what degree do you have people or a person who is encouraging you to quit?
1	2	3	4	5	In general, how healthy do you consider yourself?
1	2	3	4	5	How many people do you know who have tried to quit smoking? _____ (give number)
1	2	3	4	5	How successful have they been, in general?
1	2	3	4	5	How like these people who have succeeded are you?
					How many people have you known who have smoked while they were pregnant? _____ (give number)
					How many of these women tried to quit? _____ (give number)
					In hindsight, do any of the women who continued smoking during their pregnancy wished they had been able to quit? _____ yes _____ no _____ don't know _____

APPENDIX C

SMOKING CONFIDENCE QUESTIONNAIRE

Below is a list of situations in which people frequently smoke. Please read each one and imagine how you would feel in that situation if it were to arise while you are pregnant. If you feel that you would definitely smoke in that situation, in other words, that you could not resist, check (✓) CAN'T RESIST and move on to the next item. If you think you could resist smoking, first check (✓) CAN RESIST and then indicate how confident you are that you could resist. Use a confidence scale that ranges from 10 to 100 where:

	10	20	30	40	50	60	70	80	90	100	
	very uncertain				moderately certain					very certain	

Let's do an example with weight lifting. If you were asked to lift a 20 pound weight and felt you could do this with ease, you would answer:

Lift a 20 pound weight	CAN'T DO	CAN DO	CONFIDENCE 90
	---		

If you were asked to lift a 40 pound weight and you are only moderately certain that you could lift it, you would answer:

Lift a 40 pound weight	CAN'T DO	CAN DO	CONFIDENCE
	---	✓	40

On the other hand, if you were asked to lift a 100 pound weight and felt that you could not, you would answer

Lift a 100 pound weight	CAN'T DO	CAN DO	CONFIDENCE
	☒	☐	☐

SITUATION FOR SHOKING	CAN' T RESIST	CAN RESIST	CONFIDENCE LEVEL THAT YOU CAN RESIST
When you feel frustrated	_____	_____	_____
When you are angry with yourself	_____	_____	_____
When you're engaged in some activity(e.g. writing a letter)	_____	_____	_____

SITUATION	CAN'T RESIST	CAN RESIST	CONFIDENCE	SITUATION	CAN'T RESIST	CAN RESIST	CONFIDENCE
When you feel really happy	—	—	—	When you feel you need more energy	—	—	—
When you feel anxious	—	—	—	When you are resting	—	—	—
When you want to sit back and enjoy a cigarette	—	—	—	When you are drinking an alcoholic beverage	—	—	—
When you have finished a meal or snack	—	—	—	When you feel over- sensitive	—	—	—
When you are nervous	—	—	—	When you see others smoking	—	—	—
When you want to feel more attractive	—	—	—	When you feel impatient	—	—	—
When you feel annoyed	—	—	—	When you want to reward yourself for something you've done	—	—	—
When you want to relax	—	—	—	When someone offers you a cigarette	—	—	—
When you are trying to pass time	—	—	—	When you are waiting for Something or someone	—	—	—
When you are worried	—	—	—	When you feel uncomfortable	—	—	—
When you feel angry	—	—	—	When you want to cheer up	—	—	—
When you feel tired	—	—	—	When you want to avoid eating sweets	—	—	—
When you feel embarrassed	—	—	—	When you feel depressed	—	—	—
When you feel bored	—	—	—	When you are dieting	—	—	—
When you feel restless	—	—	—	When you feel upset	—	—	—
When you want to keep yourself busy	—	—	—	When you are drinking tea or coffee	—	—	—
When you want to concentrate	—	—	—				
When you feel tense	—	—	—				

APPENDIX D

PARTNER INTERACTION QUESTIONNAIRE

Section 1.

We are interested in finding out if certain events are helpful or unhelpful to you if you are trying to quit smoking or reduce the number of cigarettes you smoke. Please read the items listed below and rate how helpful you consider each one to be. Important: If an event has happened more than once, try to rate how unhelpful or helpful it was on the average. If an event has not happened, rate it according to how helpful or unhelpful you think it would be if it occurred. Please rate each event on the following scale:

- 1 = UNHELPFUL
- 2 = NEITHER HELPFUL NOR UNHELPFUL
- 3 = HELPFUL

- ___ Complimented my not smoking.
- ___ Mentioned the health risks associated with smoking.
- ___ Talked me out of smoking a cigarette.
- ___ Complained about my irritableness.
- ___ Commented that smoking was a dirty habit.
- ___ Commented on the amount of money spent on cigarettes.
- ___ Bought or made me a present to reward my efforts to quit.
- ___ Commented on my lack of willpower.
- ___ Said that he would not have any difficulty in quitting.
- ___ Planned with me how we would use the money saved from not buying cigarettes.
- ___ Bought me cigarettes.
- ___ Cleaned out ashtrays.
- ___ Talked about the urge to smoke.
- ___ Commented that the house smelled of smoke.
- ___ Commented that I tasted or smelled of tobacco.
- ___ Commented that smoking was hurting my ability to engage in physical activities.
- ___ Refused to participate in an activity with me that would keep me from smoking(e.g., going for a walk instead of smoking).
- ___ Suggested exercises for me to do to help me not smoke.
- ___ Left cigarettes lying around.
- ___ Refused to let me smoke in the house.
- ___ Made a special effort to keep the home environment calm.
- ___ Congratulated me for my decision to quit during pregnancy.
- ___ Helped me think of substitutes for my smoking.
- ___ Mentioned being bothered by smoke.
- ___ Kept track of the number of cigarettes I smoked.
- ___ Said I was setting a bad example by smoking.
- ___ Celebrated my quitting with me.
- ___ Ignored me when I smoked.
- ___ Hid or threw out my cigarettes.

PAGE TWO

___ Criticized my smoking.
___ Expressed indifference about my quitting.
___ Mentioned that quitting must be difficult.
___ Expressed doubt about my ability to quit/stay quit.
___ Ignored me while I was quitting.
___ Did not really notice that I was not smoking.
___ Mentioned that I was gaining weight by not smoking.
___ Took me out to dinner/ to sports event/ to a movie to reward my efforts to quit,
___ Refused to clean up my cigarette butts,
___ Mentioned the health benefits of stopping smoking.
___ Helped to calm me down when I was feeling stressed or irritable.
___ Told me to stick with it.
___ Expressed confidence in my ability to quit/remain quit.
___ Helped me to use substitutes for cigarettes.
___ Commented that my smoking was sophisticated/mature looking/attractive.
___ Expressed pleasure at my efforts to quit,
___ Participated in an activity with me that kept me from smoking (e.g. going for a walk instead of smoking),
___ Commented that I looked healthy.
___ Made an effort to keep smoking items out of sight.
___ Refrained from smoking in my presence.
___ Smoked in my presence.
___ Offered me a cigarette.
___ Commented that I didn't look healthy.
___ Kissed me for not smoking.
___ Commented that my smoking was unattractive.
___ Commented that my smoking was harmful to the fetus.
___ Commented that smoking sets a bad example for children.

Section 2

PARTNER INTERACTION QUESTIONNAIRE

We are interested in finding out if certain events have happened to you during the past week. In responding to each item, please use the scale below.

- 0 = never occurred (0 times)
- 1 = occurred rarely (1 time)
- 2 = occurred a few times (2 to 4 times)
- 3 = occurred often (more than 4 times)

During the past week my spouse/partner

- ☐ Complimented my not smoking.
- ☐ Mentioned the health risks associated with smoking.
- ☐ Talked me out of smoking a cigarette.
- ☐ Complained about my irritableness (as a result of not smoking).
- ☐ Commented that smoking was a dirty habit.
- ☐ Commented on the amount of money spent on cigarettes.
- ☐ Bought or made me a present to reward my efforts to quit.
- ☐ Commented on my lack of willpower.
- ☐ Said that he would not have any difficulty in quitting.
- ☐ Planned with me how we would use the money saved from not buying cigarettes.
- ☐ Bought me cigarettes.
- ☐ Cleaned out ashtrays.
- ☐ Talked about the urge to smoke.
- ☐ Commented that the house smelled of smoke.
- ☐ Commented that I tasted or smelled of tobacco.
- ☐ Commented that smoking was hurting my ability to engage in physical activities.
- ☐ Refused to participate in an activity with me that would keep me from smoking (e.g. going for a walk instead of smoking).
- ☐ Suggested exercises for me to do to help me not smoke.
- ☐ Left cigarettes lying around.
- ☐ Refused to let me smoke in the house.
- ☐ Made a special effort to keep the home environment calm.
- ☐ Congratulated me for my decision to quit.
- ☐ Helped me think of substitutes for my smoking.
- ☐ Mentioned being bothered by smoke.
- ☐ Kept track of the number of cigarettes I smoked.
- ☐ Said I was setting a bad example by smoking.
- ☐ Celebrated my quitting with me.
- ☐ Ignored me when I smoked.
- ☐ Hid or threw out my cigarettes.

PAGE TWO

- ___ Criticized my smoking.
- ___ Expressed indifference about my quitting.
- ___ Mentioned that quitting must be difficult.
- ___ Expressed doubt about my ability to quit/stay quit.
- ___ Ignored me while I was quitting.
- ___ Did not really notice that I was not smoking.
- ___ Mentioned that I was gaining weight by not smoking.
- ___ Took me out to dinner/ to sports event/ to a movie to reward my efforts to quit.
- ___ Refused to clean up my cigarette butts.
- ___ Mentioned the health benefits of stopping smoking.
- ___ Helped to calm me down when I was feeling stressed or irritable.
- ___ Told me to stick with it.
- ___ Expressed confidence in my ability to quit/remain quit.
- ___ Helped me to use substitutes for cigarettes.
- ___ Commented that my smoking was sophisticated/mature looking/attractive.
- ___ Expressed pleasure at my efforts to quit.
- ___ Participated in an activity with me that kept me from smoking (e.g. going for a walk instead of smoking).
- ___ Commented that I looked healthy.
- ___ Made an effort to keep smoking items out of sight.
- ___ Refrained from smoking in my presence.
- ___ Smoked in my presence.
- ___ Offered me a cigarette.
- ___ Commented that I didn't look healthy.
- ___ Kissed me for not smoking.
- ___ Commented that my smoking was unattractive.
- ___ Commented that my smoking was harmful to the fetus.
- ___ Commented that smoking sets a bad example for children.

APPENDIX E

PREGNANCY EXPERIENCE QUESTIONNAIRE

1. What type of contraception were you and your partner using at the time you became pregnant?

___ none ___ condoms &/or foam ___ diaphragm ___ IUD ___ withdrawal ___ birth control pill
___ rhythm method(calender) ___ natural fertility(mucous and temperature)

2. If you had been using a contraceptive method, how consistently were you practicing contraception? ___ on and off ___ regularly except ___ regularly with
for one brief no exceptions
point in time

3. Many women experience mixed feelings at times during their pregnancy. They are both happy about being pregnant and unhappy. How often do you have feelings like this?
___ not at all ___ rarely ___ occasionally ___ frequently ___ all the time

4. Do you think that being pregnant will change your daily routine?
___ not at all ___ somewhat ___ considerably ___ completely

How will you feel about this change most of the time?

1 2 3 4 5 6 7 8 9 10
very unhappy mixed feelings very happy

5. Do you think being pregnant will change how you see yourself?
___ not at all ___ somewhat ___ considerably ___ completely

How will you feel about this change most of the time?

1 2 3 4 5 6 7 8 9 10
very unhappy mixed feelings very happy

6. Do you think being pregnant will change your relationship with your spouse?
___ not at all ___ somewhat ___ considerably ___ completely

How will you feel about this change most of the time?

1 2 3 4 5 6 7 8 9 10
very unhappy mixed feelings very happy

7. Do you think being pregnant will change your relationship with your mother?
___ not at all ___ somewhat ___ considerably ___ completely

How will you feel about this change most of the time?

1 2 3 4 5 6 7 8 9 10
very unhappy mixed feelings very happy

8. Do you think being pregnant will change your relationship with your father?
___ not at all ___ somewhat ___ considerably ___ completely

How will you feel about this change most of the time?

1 2 3 4 5 6 7 8 9 10
very unhappy mixed feelings very happy

9. Now that you are pregnant how do you feel about it most of the time?

1 - - 2 - - - 3 - - - 4 - - - 5 - - - 6 - - - 7 - - - 8 - - - 9 - - - 10
very mixed feelings very
unhappy happy

APPENDIX F

Interview Protocol

1. How did you feel once your pregnancy was confirmed?
2. How did your partner feel when he first learned of your pregnancy?
3. Was this a good time for you to become pregnant?
4. Why (or why not)?
5. What would make this a better time for you to be pregnant?
6. What do you think about when you think of being a mother of a newborn?
7. How do you visualize yourself as a mother?
8. How often do you think about it?

Now I'd like to ask you some questions about your opinion on what would make your fetus more or less healthy.

9. What in your opinion, is important to the health of your fetus?
Name three items that come to your mind.
10. What do you feel you can do to safeguard the health of your fetus?
11. There is a lot of talk in the clinic about advising pregnant women to give up smoking. How do you feel about giving up cigarettes while you're pregnant? What do you think you will do to manage your smoking in the next six months?
12. Based on your experience, how does smoking affect your health?
How does it affect your fetus?
13. Fill in the blank: I smoke because _____

APPENDIX G







APPENDIX H

1. During this pregnancy you may have felt some periods of emotional upset or stress. Please rate the overall amount of stress you have experienced during your pregnancy on a scale of 1 to 5.

1	2	3	4	5		
no stress		moderate amount of stress		great deal of stress		
2. Rate the amount of stress you experienced during this pregnancy in each of these categories using the same 1 to 5 scale.						
		no stress		moderate		a lot of stress
work/employment	n.a.	1	2	3	4	5
finances	n.a.	1	2	3	4	5
relationship with parents	n.a.	1	2	3	4	5
housing	n.a.	1	2	3	4	5
medical problems (your own)	n.a.	1	2	3	4	5
medical problems of others	n.a.	1	2	3	4	5
relationship with your children	n.a.	1	2	3	4	5
school	n.a.	1	2	3	4	5
general worry	n.a.	1	2	3	4	5
maintaining health habits during pregnancy (e.g. nutrition)	n.a.	1	2	3	4	5
avoiding unhealthy habits for pregnancy (e.g. drugs, smoking)	n.a.	1	2	3	4	5
relationship with partner	n.a.	1	2	3	4	5

2. How many cigarettes do you now smoke? _____ per day

3. What brand do you now smoke most often? _____

4. How would you currently describe your smoking? (check one)

___ a. I smoke roughly the same amount as I did before I became pregnant

___ b. I smoke more than I did before I became pregnant.

___ c. I smoke less now than before I was pregnant.

* ___ d. I no longer smoke. I quit on _____ (give approximate date)

If you checked answer d., what are your plans regarding smoking once the baby is born? If you do not have a plan, what do you think will most likely happen?

___ a. I will probably smoke cigarettes sometime soon after the baby is born.

FOR THOSE WHO QUIT:

1. What are your plans regarding smoking once the baby is born? If you don't have a plan, what do you think will most likely happen?

☐ a. I will probably smoke cigarettes sometime soon after the baby is born.

☐ b. I will probably smoke cigarettes but not until _____

☐ c. I will probably not smoke cigarettes after the baby is born.

#####May Gail Nethercut contact you by phone 3 to 4 months after your baby is born?

☐ yes, my phone number is: _____ signature _____

☐ no, I'd prefer she did not call.

2. Which cigarette did you hate most to give up?

☐ a. first cigarette in the morning

☐ b. cigarette during or after meals

☐ c. cigarette during or after a stressful situation

☐ d. cigarette during or after a social event

☐ other (please specify) _____

☐ f. none of the above

3. What was your partner's opinion of your abstaining from cigarettes during your pregnancy?

☐ a. he was against my quitting

☐ b. he did not care one way or the other

☐ c. he was supportive of my quitting

☐ d. I am not partnered

FOR THOSE WHO SMOKE:

1. Which cigarette would you hate most to give up?

☐ a. first cigarette in the morning

☐ b. cigarette during or after meals

☐ c. cigarette during or after stressful situations

☐ d. cigarette during or after a social event

☐ e. other (please specify) _____

☐ f. none of the above

2. What is your partner's opinion of your smoking during pregnancy?

☐ a. he is against my smoking

☐ b. he does not care one way or the other

☐ c. he is supportive of my smoking

☐ d. I am not partnered

For Everybody:

Which of the following do you think could have been helpful in strengthening your efforts to quit or cut down on cigarettes during pregnancy? Please indicate your two top choices by placing a "1" next to your first choice and a "2" next to your second.

____ Participate in a stop smoking group with other pregnant women.

____ Receive written materials or handouts explaining the risks of smoking during pregnancy.

____ Be given a special opportunity to discuss with my nurse or doctor the risks of smoking during pregnancy.

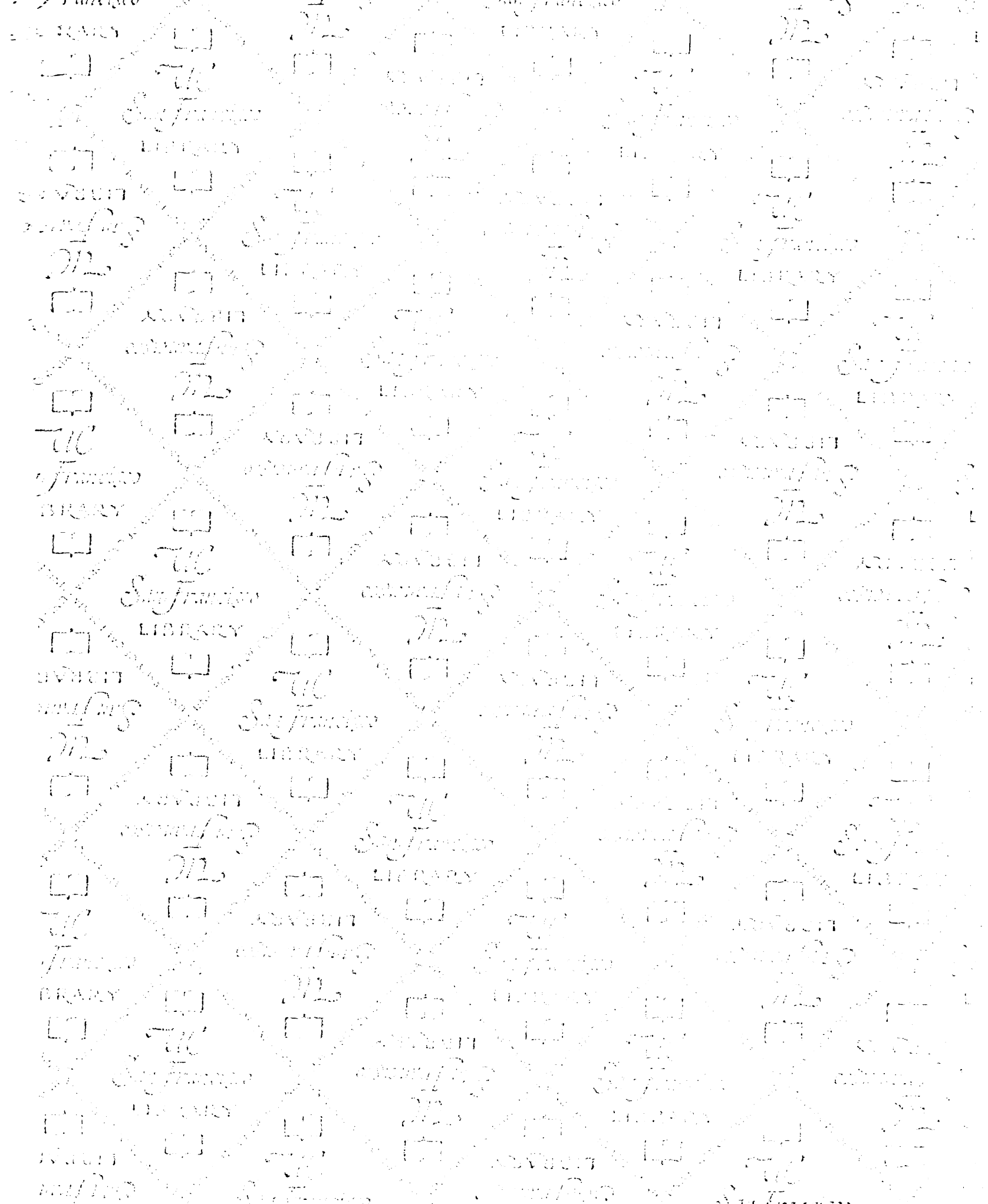
____ Participate in a stop smoking group with my partner.

____ Be given a self-help kit to stop smoking.

____ Other (please specify) _____

____ None of these would have been helpful to me.

THANK YOU VERY MUCH FOR YOUR TIME & EFFORT



FOR REFERENCE

NOT TO BE TAKEN FROM THE ROOM

CAT. NO. 23 012

