Application of the Transtheoretical Model of Change to the Smoking Behavior of Men During their Partner's Pregnancy

THESIS
SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
OF THE UNIVERSITY OF MINNESOTA
BY

Mary Ellen Tanner

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

Dr. Mariah Snyder and Dr. Melissa Avery, Co-Advisers

September, 2002

UNIVERSITY OF MINNESOTA

This is to certify that I have examined this copy of a doctoral thesis by

Mary Ellen Tanner

and have found that it is complete and satisfactory in all respects,
and that any and all revisions required by the final
examining committee have been made.

Mariah Snyder Melissa D. Avery

Names of Faculty Advisers

Signatures of Faculty Advisers

August 13, 2002 September 4, 2002

Date

GRADUATE SCHOOL

ACKNOWLEDGEMENTS

I am very grateful for the expert advice and support from the members of my doctoral committee. My gratitude goes first to my academic advisor, Dr. Mariah Snyder, for her continual mentorship and wisdom throughout my educational program. Her generosity in sharing her time and talents are very much appreciated. I would also like to thank the other members of my committee, Dr. Melissa Avery, my co-adviser, Dr. Felicia Schanche Hodge, and Dr. Joän Patterson for their guidance and suggestions along the way. In addition, I would like to thank Dr. Betty Lia-Hoagberg who steered me in the right direction for this research, and Dr. LaVohn Josten for her early guidance.

I am grateful for the support of my family and would like to thank them for their patience, love and encouragement. Likewise, I appreciate the continual encouragement I received from many friends and nurse colleagues. I would particularly like to thank members of my doctoral cohort, along with Sr. Beverly Raway, Sr. Kathy Niska, Joanne Blyler and Sara McCumber, who supported me in countless ways.

Completion of this research was facilitated by many individuals, especially the nurse colleagues and the study participants, and I would like to express my thanks for their tremendous assistance and support. The financial support from the Minnesota Nurses Association Foundation was greatly appreciated.

I would like to dedicate this research to Grace Martin, who shared her home and her years of wisdom while I went to school, and to my parents, Gordon and Gladys Wales, who taught me many things.

ABSTRACT

This study describes the smoking behavior and selected characteristics of men during their partner's pregnancy. Constructs of the transtheoretical model of behavior change were used to describe socio-demographic characteristics of these men, to compare their smoking behavior in various stages of change, and to explore the relationship of the smoking behavior of the male partner to that of the pregnant partner. The study used a non-experimental, descriptive correlational design with a self-administered survey tool. A convenience sample was recruited in the Midwest region of the U.S. from local childbirth education classes, healthcare provider offices, Women, Infants, and Children (WIC) clinics, and prenatal public health home visits.

The sample of 74 men had a mean age of 27 years (*SD* = 5.8) and 57% were married. While 63 (85%) of the participants continued to smoke during their partner's pregnancy, 57% of these men were seriously considering quitting within the next six months. Over two thirds of the female partners (n = 51) were not smoking at the time of the survey, but 23 women continued to smoke during pregnancy.

There were no significant differences in demographic variables, level of nicotine dependence and temptation to smoke among men in the various stages of behavior change. More of the men who smoked had partners who smoked during pregnancy when compared to the men who were no longer smoking. Compared to smokers in the general population, an increased percentage of smokers in this study were contemplating quitting smoking. These figures are related to low levels of nicotine dependence, an increased motivation to quit smoking, especially in a first pregnancy, increasing social pressure not to smoke, and local regulatory efforts to promote smoke-free public environments. A comprehensive approach to smoking cessation is needed,

including a further understanding of the smoking behavior of men during their partner's pregnancy and factors that influence behavior change.

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CHAPTER I

INTRODUCTION

Background

The Surgeon General's report on smoking and health in 1964 (U.S. Department of Health, Education and Welfare [U.S. DHEW]) documented the relationship between cigarette smoking and cancer and other serious diseases; the amount of scientific knowledge regarding the relationship between health and tobacco has dramatically increased since that report was published. Researchers have identified the chemicals in tobacco smoke that cause cancer and other illnesses in humans, have identified factors associated with tobacco use, and have devised interventions and guidelines for smoking cessation programs. Disease risks extend to nonsmokers who inhale environmental tobacco smoke (ETS) at home, at work, or in public places (National Cancer Institute [NCI], 1999). Infants and young children are particularly susceptible to the adverse effects of ETS (Ashley, 1998). Russell (1999) emphasizes, "active and passive tobacco exposure during and after pregnancy has been identified as the major cause of maternal, fetal and infant morbidity and mortality" (p. 1). Legislation and public policy have limited smoking in work environments and public locations, but not in homes. Despite an increased awareness of the potential harmful effects of smoking and ETS exposure, smoking and its effects on health continue to be a major public health problem.

Despite reduction in prevalence of cigarette smoking in the last 40 years, recent statistics show that approximately 26% of men ages 18 and over smoke, while the rate for women of the same age is 21.5% (Centers for Disease Control and Prevention [CDC], 2001). In 1999, 12.3% of women giving birth in the U.S. reported smoking during pregnancy (Mathews, 2001). These figures vary by age, race, residence and smoking

amount. The rate of smoking and exposure to ETS during pregnancy has declined each year between 1990 and 1996 (Mathews, 1998), but the rates of smoking for all women 15-19 years of age have increased in the last two years. In 1991, 43% of U.S. children ages 20 months to 11 years lived in a home with at least one smoker (Pirkle et al., 1996). All parents must still be encouraged to stop smoking during pregnancy to maximize the health benefits of cessation to their infants.

Smoking and its Health Effects

Effects of Smoking on Pregnancy Outcomes

Maternal smoking before, during, and after pregnancy is one of the biggest public health challenges today, because of the relationship between maternal smoking and poor pregnancy outcomes for women and their infants in the United States. The relationship between smoking and reduced birth weight was first established in the research literature forty years ago. Research during the last twenty years has demonstrated other smoking-related risks. Maternal smoking is associated with 20%-30% of the low-birth-weight rate and 10% of the infant mortality rate in the U.S. (DHHS, CDC, 2000; Kleinman et al., 1988). Results of a study done in Norway in 1995 demonstrated that infants of mothers who smoked 10 or more cigarettes per day in the last trimester had an increased risk of being small for gestational age (Nafstad et al., 1998). Smoking during pregnancy is also associated with an increased incidence of spontaneous abortion, placenta previa, abruptio placenta, intrauterine growth retardation (IUGR) and preterm delivery (Britton, 1998; Castles, Adams, Melvin, Kelsch, & Boulton, 1999; Floyd, Rimer, Giovino, Mullen, & Sullivan, 1993; Ness, Grisso, Hirschinger et al., 1999). Pollack (2001) reported that "prenatal maternal smoking more than doubles the estimated risk of SIDS" (p. 434).

Results of studies on paternal smoking and its effects on the fetus and newborn have been contradictory (Walsh, 1994); exposure to passive smoking may or may not have an effect on pregnancy outcomes. Martinez, Wright, Taussig, and the Group Health Medical Associates (1994), using serum cotinine levels for verification of smoking status, demonstrated paternal smoking has a significant influence on birthweight in newborns of non-smoking mothers. The misclassification of smoking status based on self-report only, without biochemical validation, may have influenced other studies where paternal smoking and decreased birthweight showed a positive relationship (Martinez et al.). Chatenoud et al. (1998) found no association between paternal smoking and spontaneous abortion in a study of 782 cases of spontaneous abortion in Italy. However, researchers documented a mean birthweight deficit of 88 grams in newborns of non-smoking mothers whose fathers smoked more than 20 cigarettes a day. In a study of 1785 full-term infants of non-smoking mothers in Shangai, Zhang and Katcliffe (1993) reported an average of 30 grams lower birthweight between infants with ETS exposure, after adjusting for gestational age, parity, maternal age, and occupation. In a retrospective study of 34,799 mothers giving birth in Norway in 1970-1991, Haug et al. (2000) determined that smoking by both parents was related to a significant reduction of 48 grams in birthweight when compared with infants with a smoking mother and a non-smoking father. No significant effect of paternal smoking was seen, however, when the mother was a non-smoker.

Effects of Environmental Tobacco Smoke on Infants and Children

The home is the single most important source of ETS exposure for children (Ashley, 1998). Currently, 27% of US children age six and under are exposed to tobacco smoke inside the house at least 4 days per week (U.S. DHHS, 2000). Parental smoking results in annual medical expenditures for children of $4.6 billion (Aligne & Stoddard,

1997). Based on conservative estimates, approximately 284-360 children die each year related to illnesses and fire-related injuries attributable to others' smoking (DiFranza & Lew, 1996). ETS exposure is associated with an increased incidence of Sudden Infant Death Syndrome (SIDS), behavior problems, attention deficit hyperactivity disorder (ADHD) in childhood, and congenital deformities (Berman & Gritz, 1991; Day, Richardson, Goldschmidt, & Cornelius, 2000; Milberger, Biederman, Faraone, Chen, & Jones, 1996; NCI, 1999; Orlebeke, Knol, & Verhulst, 1997; Pollack, 2001; Reefhuis, deWalle, & Cornel, 1998).

Postnatal exposure of children to environmental tobacco smoke is also causally associated with infections of the lower respiratory tract, asthma, wheezing, ear infections, and decreased lung function (DiFranza & Lew, 1996; Gilliland, Li, & Peters, 2001; Hecht et al., 1994; U.S. DHHS, Environmental Protection Agency [EPA], 1993). In a meta-analysis of 13 studies of the association between ETS and respiratory tract infection in early childhood, Li, Peat, Zuan, and Berry (1999) concluded that the child of a parent who smokes was at twice the risk of having a respiratory tract infection in early life that required hospitalization, particularly prior to two years of age. The effects are less detectable in school children, who may have developed immunity against respiratory pathogens or may be less exposed than younger children (NCI, 1999). There is also evidence of a dose-response relationship between ETS exposure and childhood respiratory illness for both maternal and paternal smoking. Children whose parents are in the lower socio-economic brackets are at an increased risk from passive smoking, because they are more likely to live in households where both parents smoke (Miller & Hunter, 1990). The relationship between parental smoking and childhood cancers is inconclusive at this time because of study limitations and conflicting results (NCI).

Benefits of Smoking Cessation

Smoking and its effects on health, particularly that of infants and children, are major public health concerns. Tobacco use, particularly cigarette smoking, remains the most important preventable cause of death in our society (U.S. DHHS, 2000). The elimination of smoking would yield substantial health benefits for the general public and for individual smokers. Smoking cessation during pregnancy could have an important impact beyond the prevention of adverse pregnancy outcomes.

Smoking cessation at any point during pregnancy can have positive effects for both mother and infant. The cessation rate is greater if pregnant women are given assistance with cessation, and if programs designed to meet the specific needs of the pregnant population are utilized (Mullen, Ramirez, & Groff, 1994; Windsor, Boyd, & Orleans, 1998). Women who stop smoking before becoming pregnant or quit within the first four months of pregnancy have infants of the same birthweight as those born to women who have never smoked. Smoking cessation could also substantially decrease the number of perinatal deaths, incidence of low birthweight, and the number of preterm deliveries in the United States. The strong relationship between respiratory illness in children and their level of tobacco smoke exposure suggests that smoking cessation during and after pregnancy could eliminate most of this excess risk by eliminating children's exposure to environmental smoke. Preventing children from regular exposure to ETS is one of the largest challenges in maternal-child health today.

Key Factors in Smoking Cessation

General Factors

Many factors that affect smoking behavior and smoking cessation have been identified in the research literature, including individual, cognitive, psychological, sociocultural, and physiologic (addictive) aspects. Variables studied include: gender,

education, nicotine dependence, smoking history, treatment characteristics, self-efficacy, stress, coping style, health symptoms, tobacco withdrawal, and social support. Women are more likely than men to smoke as a coping mechanism for anxiety, tension, and stress (Bjornson, 1996). They are less likely than men to perceive the health benefits of quitting and less likely to quit smoking successfully (Wetter et al., 1999). The causes of these gender differences are unknown. Socioeconomic factors, such as education and occupation, are frequently linked to smoking status and cessation (Appleton & Pharaoh, 1998; Wakefield, Gillies, Graham, Madeley, & Symonds, 1993).

Smoking is both physically and psychologically addictive. Nicotine, the addictive drug in tobacco, creates tolerance, physical dependence, and withdrawal effects when habitually used (Andrews, 1998). The smoking habit also creates a psychological dependence as the individual associates smoking with stress or negative emotions, or with enjoyable activities such as eating or socializing. Contact with family, friends, and coworkers who smoke can also have a significant impact on smoking cessation and relapse (Appleton & Pharaoh, 1998).

One factor that may affect cessation is self-efficacy. Self-efficacy, based on Bandura's social learning theory (Bandura, 1977), is described as a person's confidence in one's ability to engage in healthy behaviors and resist temptations to engage in unhealthy behaviors (Peipert & Ruggiero, 1998). Self-efficacy is a reliable predictor for successful smoking cessation (Kowalski, 1997; Mudde, Kok, & Strecher, 1995; Woodby, Windsor, Snyder, Kohler, & DiClemente, 1999). Increasing an individual's self-efficacy throughout the stages of behavioral change, i.e., by building self-confidence and teaching ways to manage temptations, may enhance cessation efforts.

The relationship between stress and smoking is described as bi-directional; smokers increase their smoking behavior when stressed (Britt, Cohen, Collins, & Cohen,

2001), higher levels of stress make it more difficult to stop smoking, and failure to stop smoking increases stress and decreases one's self-efficacy (Carey, Kalra, Carey, Halperin, & Richards, 1993; Cohen & Lichtenstein, 1990; Hecht et al., 1994). Successful quitters experience less perceived stress and cope better than relapsers (Fava, Velicer, & Prochaska, 1995). The most common risks for relapse during smoking cessation attempts are "times of emotional distress, such as anger, anxiety, boredom, depression, and stress" (Prochaska, 1996, p. 723).

Motivation is also considered a key element in smoking cessation, described in terms of why smokers quit and their strength of desire to do so (Curry, Wagner, & Grothaus, 1990). Curry et al. differentiated between internal and external motivation; internal motivation was operationalized as health concerns and self-control, while external motivation dealt with immediate reinforcement and social influence. They concluded that successful quitters have significantly higher levels of internal motivation and lower levels of external motivation.

Pregnancy as a Motivating Factor to Change Behavior

Pregnancy has been shown to have a positive effect on a woman's readiness to change lifestyle behaviors, particularly early in pregnancy (Albrecht, Cassidy, Reynolds, Ketchem, & Abriola, 1999; Crittenden, Manfredi, Lacey, Warnecke, & Parsons, 1994; Ziebland & Mathews, 1998). Among women of reproductive age (18-44 years old), cigarette smoking has decreased over the last thirty years to an overall prevalence of 26%, and an average number of cigarettes smoked per day of 16 (Floyd et al, 1993).

Spontaneous quit rates (women who quit smoking shortly after the pregnancy is confirmed) range from 15-42% (Windsor et al., 1998). Another 12% of pregnant women will stop smoking later in pregnancy (Fingerhut, Kleinman, & Kendrick, 1990). Approximately 65-80% of these 'spontaneous quitters' will remain smokeless throughout

pregnancy (Mullen, Quinn, & Ershoff, 1990). Relapse occurs for 21-35% of these spontaneous quitters before birth, and approximately 70% of women who quit smoking during pregnancy will experience a relapse within one year of the birth (Mullen et al.). Those who quit later in pregnancy have a greater incidence of relapse than those who quit in early pregnancy (Fingerhut et al.).

Primary reasons cited by women for quitting before or during pregnancy are fear of adverse pregnancy outcomes and infant health problems (Floyd et al., 1993; Johnson, Ratner, Bottorff, Hall, & Dahinten, 2000). Other reasons for quitting include advice from family or physician, illness or nausea from smoking (Floyd et al.), and a desire to breastfeed (Ko & Schulken, 1998; McBride & Pirie, 1990). Reasons for wanting to continue smoking included high levels of stress, social isolation, and distress, and concerns about weight gain (Floyd et al.; McBride & Pirie; McFarlane, Parker, & Soeken, 1996). Among pregnant women, several sociodemographic factors combine or interact to play a key role in smoking cessation. When compared to pregnant women who quit smoking or cut down during pregnancy, women who continue to smoke are more likely to be older, have less education, live with individuals who smoke, have a longer history of smoking and higher smoking levels, perceive a high degree of stress, belong to a lower socioeconomic group, and have previous smoking behavior during pregnancy (McBride & Pirie; Severson, Andrews, Lichtenstein, Wall, & Zoref, 1995). A decision to continue smoking may also be influenced by personal beliefs regarding the potential harm of the behavior or social disapproval of pregnant women who smoke. Some individuals may continue to smoke because they are not aware of the risks of tobacco smoking to the fetus or the infant, since their effects are not always immediately apparent. There is evidence of social disapproval for smoking by women during pregnancy, but not for men (Wakefield, Reid, Roberts, Mullins, & Gillies, 1998).

The Role of the Spouse/Partner in Smoking Behavior and Cessation

A consistent relationship between the smoking status of pregnant and postpartum women and their partners has been found in research studies done in the U.S., United Kingdom, and Scandinavian countries (Cnattinguis, Lindmark, & Meirik, 1992; Mullen, DiClemente, & Bartholomew, 2001; Severson et al., 1995; Wakefield et al., 1993; Waterson, Evans, & Murray-Lyon, 1990; Ziebland & Mathews, 1998). The results of these studies demonstrate that for pregnant women whose partners smoke, there is an increased incidence of smoking by the pregnant woman, a decreased likelihood of quitting spontaneously or after intervention, and a greater incidence of relapse to smoking after childbirth (Appleton & Pharoah, 1998; McBride & Pirie, 1990; McBride, Pirie & Curry, 1992; Mullen et al., 2001; Wakefield et al; Woodby, Windsor, Snyder, Kohler, & DiClemente, 1999; Ziebland & Mathews). Women who smoked throughout pregnancy were more than twice as likely to have a spouse/partner who smoked than were those women who quit during pregnancy (McBride et al., 1998; Severson et al.). Women who relapsed after childbirth were almost four times as likely to have a spouse/partner who smoked than were mothers who did not relapse. Using a cohort of 106 women who quit smoking during pregnancy, McBride, Pirie and Curry (1992) demonstrated that women married to a smoker "were more likely to relapse between six weeks to six months postpartum than were women who were married to a non-smoker" (p. 387). A high prevalence of smoking among others in the household is particularly relevant for women of low socioeconomic status (Floyd et al., 1993).

Although the smoking behavior of men appears to be less affected by an infant's birth than for women, childbirth has been associated with increased rates of smoking cessation in men. This is true particularly for those whose partner did not smoke or stopped smoking at the beginning of the pregnancy (Brenner & Mielck, 1993; Hyssälä,

Rautava, Helenius, & Sillanpää, 1995). Appleton and Pharoah (1998) demonstrated that partner quitting or reduction in early pregnancy is predictive of women's maintenance of quitting or reduction through late pregnancy. Reduced smoking and successful cessation by pregnant women have also been positively associated with partner support to stop smoking and partner willingness to reduce their own cigarette consumption (Haug, Aarø, & Fugelli, 1992; Wakefield & Jones, 1998; Waterson et al., 1990). Because of this relationship between partner smoking status and cessation, pregnancy is viewed as an opportune time for women and their partners to quit smoking. Targeting behavioral change in partner smoking is viewed as critical to the success of smoking cessation efforts by both parents during and after the perinatal period (Appleton & Pharoah; Brenner & Mielck). At the present time, however, there are few direct studies of partner smoking behavior during pregnancy; it has been often treated as a secondary focus of studies and measured indirectly by maternal reporting (Appleton & Pharoah; Chatenoud et al., 1998; Waterson et al., 1990; Ziebland & Mathews).

Statement of the Problem

Cigarette smoking is the single most preventable cause of premature death and disability in the U.S. (U. S. DHHS, CDC, 2000). Even though the prevalence of smoking is decreasing, patterns of cigarette smoking in the U.S. have shifted over the years among several high-risk groups. An increase in smoking among women and younger parents affects the *in utero* exposure and environmental tobacco smoke exposure of infants and children. Extensive research on smoking and cessation has led to the development of an increased understanding of key factors related to cessation. However, a great deal of research has focused on many of the demographic variables related to smoking cessation, rather than the modifiable characteristics such as health beliefs about smoking or self-efficacy related to smoking cessation. Intervention

research has resulted in the development of practice guidelines and intervention strategies for smoking cessation at both the individual and community levels. Despite these efforts, there remains a need to explore changes in smoking behavior by looking at the contextual factors associated with smoking cessation from a theoretical perspective. One of the key contextual factors that influences smoking behavior change during the perinatal period is the smoking habits of the male partner. Although research data and intervention studies exist for women during and after pregnancy, there is minimal information available about the characteristics associated with smoking behavior change among men during the perinatal period.

Research Questions

The specific research questions addressed in this study were:

1. What are the stages of change in smoking behavior of men whose partners are pregnant?
2. What is the association between age, education, ethnic background, socioeconomic status, and level of nicotine dependence with partner [male] smoking behavior during the prenatal period?
3. What processes of change are used by men along the continuum of stages of smoking behavior change during their partner's pregnancy?
4. What is the level of temptation and decisional balance of men along the continuum of stages of smoking behavior change during their partner's pregnancy?
5. What is the association between the smoking status of the female partner who is pregnant and that of her partner?

Significance of the Study

Studies have consistently shown that partner influence is one of the major determinants for smoking behavior change during pregnancy (Mullen et al., 2001;

Ziebland & Mathews, 1998). Most of the current research on smoking cessation and pregnancy and postpartum has focused on the pregnant woman, rather than her partner. Studies that provide information regarding partner support and smoking behavior change have received the data from the pregnant women rather than from the male partners (Wakefield & Jones, 1998; Waterson, 1990; Appleton & Pharoah, 1998). One qualitative study utilized focus groups to gather direct information from men (Wakefield et al., 1993). Few of these studies have used a theoretical approach to study partner smoking behavior; one used the transtheoretical model of behavior change (Mullen et al; Prochaska et al., 1998). This particular model identifies stages of health behavior change and specific processes utilized in smoking behavior change that lead to smoking cessation. Based on these stages and processes, specific intervention strategies can be developed and studied. The current research focuses on some of the factors associated with partner smoking, such as reasons for smoking, factors that influence partner change, and behavioral change occurring during pregnancy. Direct data highlights the relationship between the pregnant woman and her partner from the partner's (male) perspective. Once more information is known regarding partner's perception and smoking behavior, specific interventions can then be devised to implement cessation activities for both partners. Identification of the smoker's stage of change will help to identify those at greatest need for nursing intervention. Because of the number of frequent contacts between parents and health care providers during the prenatal and postpartum periods, there is potential for consistent, realistic health messages related to the effects of smoking and effective methods for smoking cessation and maintenance that will benefit both parents and their children.

Theoretical Framework

The transtheoretical model of behavior change (TTM) (Prochaska, Johnson, & Lee, 1998) was used as the framework for this study. This model describes the process individuals use to intentionally change their health behavior and focuses on variables in the internal and external environment that can effect such change. Change is viewed as a process involving progression through a series of mutually exclusive stages and the use of experiential and behavioral strategies to facilitate and maintain the change. Other key variables, such as self-efficacy, temptation and internal and external factors, influence movement through the various stages. The TTM was appropriate for this study because of its utility in understanding and designing effective intervention programs for various smoking populations. Many smoking intervention programs are developed primarily for people ready to quit smoking and do not take into account those smokers not ready to make a change or those who have recently quit (Ruggiero & deGroot, 1998). This stage model takes this factor into consideration by looking at variables in both the internal and external environments that affect the individual's decision to change the specific health behavior. Pregnancy provides a window of opportunity for health care providers to promote positive health behaviors and a smoke-free lifestyle for all family members. Stage-matched individualized interventions are currently being developed for women who smoke during pregnancy (Ruggiero, Redding, Rossi, & Prochaska, 1997) and for women who stopped smoking during pregnancy but may begin smoking again during postpartum (Mullen et al., 2001). However, information is lacking regarding the role of the spouse/partner in these cessation efforts.

CHAPTER II

REVIEW OF THE LITERATURE

The topics of tobacco use and smoking cessation have received widespread coverage by researchers from many disciplines, including medicine, nursing, sociology, psychology, and public health. An extensive literature review was carried out using several databases to capture each of these perspectives and to review literature relevant to smoking cessation by partners of pregnant women. The review of the literature covered a 20-year period, from 1980-2001. The search included the use of several electronic bibliographic databases, including CINAHL, HealthSTAR, PsycINFO, Cochrane Database of Systematic Reviews, HaPI, and "New Citations" from TIPS, a resource sponsored by the Centers for Disease Control and Prevention (CDC). This chapter describes literature relevant to the purposes of this research: a brief description of significant historical events related to attempts to decrease smoking in the United States, an overview of smoking behavior from a national and regional perspective to indicate the current extent of the problem, current issues in research on tobacco use and smoking cessation, and topics related to the concept of the smoke-free family. Gaps in the literature and how the findings from the current research will help fill some of those gaps were then identified. The transtheoretical model of change that serves as the basis for this research is described.

Significant Historical Events

Significant advances have been made in the last century in knowledge about tobacco use and its effects on health. Some of these historic landmarks are identified to document progress in the United States related to control of tobacco use.

Several different forces have affected the use of tobacco in the United States. Some of these forces include early anti-tobacco activities based on the moral and hygienic principles of the period around 1880-1920, medical and epidemiological research in the 1930s-1960s, and the landmark Surgeon General's Report on smoking and health in 1964 (U.S. Department of Health, Education and Welfare, 1964). The movement to reduce smoking in the 1970s and 1980s, at both the grassroots and national levels, resulted in legislation regulating cigarette advertising and health warnings on cigarette packaging. During this same period, some airlines and public establishments developed smoking and non-smoking sections, and states created indoor clean air restrictions. The movement to protect nonsmokers' rights was strengthened with governmental reports on environmental tobacco smoke (ETS), which found that passive smoking was a cause of a higher incidence of lung cancer in nonsmokers (U.S. DHHS, CDC, 2000), and substantially increased the risk of respiratory problems in children. One of the strongest statements regarding ETS appeared in 1992, when the Environmental Protection Agency (EPA) concluded that ETS was a Class A carcinogen (U.S. DHHS, EPA, 1993) and responsible for approximately 3,000 deaths annually from lung cancer among nonsmokers. The 1990s saw an increase in excise taxes for tobacco and state settlements with the tobacco industry, enabling several states to initiate large-scale anti-tobacco campaigns.

In addition to these legislative and regulatory developments, other initiatives have had a major impact on tobacco use. One priority has been tobacco use prevention among youth through anti-smoking campaigns, restriction of advertising directed at the youth population, education in the schools, increased cost of cigarettes, and monitoring the sale of tobacco to youths (Britton, 1998; U.S. DHHS, 2000). A second priority affecting tobacco use is the role of the health care provider through client assessment

and intervention. The importance of this role is evidenced through the updated recommendations of the clinical practice guideline, "Treating Tobacco Use and Dependence" (Fiore, 2000). These research-based guidelines support the role of both clinical and pharmacological interventions in tobacco cessation. Despite these intervention efforts, further research related to tobacco use is necessary to determine cost-effective interventions that will prevent individuals from smoking, increase the quit rate of smokers, decrease the level of exposure of nonsmokers to ETS, and decrease the disparities among different population groups (U.S. DHHS, 2000).

Recent efforts in the United States to control and prevent tobacco use are outlined in the latest Report of the Surgeon General, "Reducing Tobacco Use" (U.S. DHHS, CDC, 2000). This report emphasizes that a comprehensive approach using educational, clinical, regulatory, economic, and social strategies should be the guiding principle for future efforts to reduce tobacco use. Such a comprehensive approach "recognizes that individual behavioral choices occur in a larger, complex context" (p. 373) and is consistent with health promotion strategies that emphasize the social, economic, and environmental influences that help determine behavioral change. Both federal and state programs continue to invest large sums of money in tobacco prevention and control. Use of a comprehensive approach to decrease tobacco use would also be effective in improving the health of the U.S. population and help to meet the tobacco-related objectives in *Healthy People 2010* (U.S. DHHS, 2000).

In summary, tobacco-related research has focused on knowledge related to tobacco use and its effect on health for almost half a century. Major efforts are currently underway in the United States to prevent tobacco use and to reduce the effects of tobacco use for smokers and nonsmokers, but disparities in use still exist based on race/ethnicity, socioeconomic status, age and gender. The Centers for Disease Control

and Prevention (CDC) has identified six challenging areas in need of effective intervention strategies to reduce the effects of tobacco use: prevalence of smoking by high school students, constant prevalence of smoking among adults, disparities in use and adverse health outcomes based on race/ethnicity and socioeconomic status, exposure to environmental tobacco smoke (ETS), use of products to reduce the harmful effects of tobacco, and an increase in tobacco use throughout the world (U.S. DHHS, CDC, 2000). Despite recent achievements, an estimated 46.5 million adults in the U.S. smoke cigarettes (CDC, 2001). The challenge of the current century will be to determine effective intervention strategies to reduce the health and economic burdens associated with smoking.

Demographic Profile of Smokers: Extent of the Problem

The smoking prevalence among both men and women remained relatively constant from 1993-1999, but data is currently indicating a slow but steady decline. There has been a reduction of smoking prevalence among persons aged ≥ 18 years from 42% (1965) to 24% (1997), with the rate of smoking for men (25.7%) higher than that for women (21.5%) (CDC, 2001). Figures for 1999 indicate that the prevalence of smoking is highest among persons aged 18-24 years (27.9%) and 25-44 years (27.3%). Large differences in tobacco use exist among racial/ethnic groups and socioeconomic levels. Prevalence of smoking is highest among American Indians/Alaska Natives (40.8%), persons with 9-11 years of education (35.4%), and among persons living below the poverty level (33.1%).

In the region of this study, Minnesota has a prevalence of current cigarette smoking among adults of 19.5%, with a slightly higher percentage of males (21.7%) than females (17.3%) (CDC, Office on Smoking and Health, 2001). Of these smokers, 9.1% of Minnesota households have smokers with children in their homes (CDC, 1997). A

total of 88.9% allow smoking in some or all areas of the home, exposing 21.6% of Minnesota children to ETS in the home. Wisconsin has a greater percentage of adult smokers (24.9%), with rates for men and women at 27.6% and 22.4% respectively. In Wisconsin, 11.4% of homes have children living with smokers, exposing 28.5% of children to ETS. A recent survey of adult residents in a sixteen-county region in northeastern Minnesota and northwestern Wisconsin (population approximately 481,000) indicated that 22.2% of the respondents currently smoke cigarettes, with the highest prevalence in the youngest age groups (18-24 years old) for both males (32.5%) and females (35.4%) (Block et al., 2000). Of all respondents, almost 24% reported that someone regularly smoked inside their home; approximately 14% had children less than 5 years old living in the home and 29% had children 5-17 years old living in the home.

Issues in Research on Tobacco Use and Smoking Cessation

Much of the recent literature on tobacco use and smoking cessation intervention uses the transtheoretical model of change (TTM) for its theoretical base. This theory and its use in research are discussed. Then, more limited literature on nicotine dependence, an addiction model, and related measurement tools are reviewed.

Transtheoretical Model of Behavior Change

The transtheoretical model of behavior change (TTM) is a framework for understanding the process of how individuals intentionally change their health behavior. The term "transtheoretical" is applied to the model because it integrates principles from several leading theories of psychotherapy and behavior change (Prochaska et al., 1998). The TTM views behavior change as a developmental, rather than linear, process, and focuses on variables in the internal and external environment that can effect change.

The transtheoretical model has five key constructs: stages of change, processes of change, self-efficacy, situational temptation, and decisional balance. Within the model,

change is viewed as a process involving progress through a series of six stages representing temporal, motivational, and constancy aspects of change: pre-contemplation, contemplation, preparation, action, maintenance, and termination (DiClemente, Prochaska, & Gilbertini, 1985; Prochaska & Velicer, 1997; Velicer & Prochaska, 1999). In the precontemplation stage, the client has no intention to change a particular behavior in the foreseeable future, usually measured as the next six months. In the contemplation stage, the client is seriously thinking about change in the next six months and is acutely aware of the costs and benefits of behavior change. The preparation stage involves change in the near future, usually within the next month; the individual may already have taken some small steps toward modifying the behavior (Peipert & Ruggiero, 1998). During the action stage, the individual modifies behavior, experiences, or the environment in order to change his/her lifestyle, usually over a six-month period. It is during this stage that the individual is expected to reach a specified criterion that experts agree will reduce the risks from the negative behavior. The fifth stage, maintenance, is an indefinite period and is characterized by efforts to continue the new behavior and prevent relapse. The last stage, termination, is the stage in which the individual experiences no temptation to revert to the previous behavior. The developers of the TTM note that this stage may be an ideal goal rather than practical reality for most people, and the termination stage has been given little emphasis in their research (Prochaska & Velicer, 1997). Progression through these six stages is spiral rather than linear, as individuals often relapse to earlier stages during behavior change attempts (Clark, Rakowski, Kviz, & Hogan, 1997). Early formulations of the TTM depicted only four stages but that has been modified and refined. The preparation stage, originally called decision-making, has been added to the original model (Prochaska, DiClemente, & Norcross, 1993). One of the major premises of the TTM is that the intensity, duration,

and type of intervention employed to change a health behavior should be matched to the individual's stage of change—their degree of readiness to change—in order to maximize the effectiveness of the intervention. An intervention is deemed effective if it moves the individual sequentially to the next stage (Prochaska, 1996).

A second dimension of the transtheoretical model is the processes of change, which are experiential and behavioral strategies that individuals employ to facilitate and maintain change (Prochaska, Velicer, DiClemente, & Fava, 1988). These two categories of processes are the overt and covert coping activities that people need to apply, or be engaged in, to move from stage to stage and successfully modify their behavior (Prochaska et al., 1988; Velicer et al., 1998). The experiential processes are cognitive, evaluative, and affective approaches that help the individual get ready to take action; their use peaks in the contemplation stage. These experiential processes have been identified as consciousness-raising, dramatic relief, self-reevaluation, environmental reevaluation, and social liberation. The behavioral processes are the necessary activities used once the person is ready to take action; their use peaks in the action and maintenance stages. These behavioral processes of change have been labeled self-liberation, counter-conditioning, stimulus control, reinforcement management, and helping relationships (Prochaska, DiClemente, & Norcross, 1993). Different processes need to be employed at different stages of change in order for change to occur (Prochaska, Norcross, & DiClemente, 1994). Perz, DiClemente, & Carbonari (1996) concluded "successful negotiation of the stages [of change] requires the proper process use at the correct stage" (p. 466). This common set of change processes has received empirical support with several behavior issues such as smoking and exercise, although significant differences exist in their frequency of use across these problems.

Other key variables, reflecting cognitions and evaluations about the health behavior, influence movement through the stages of change. These variables include self-efficacy, temptation, and decisional balance. Self-efficacy refers to one's belief or confidence in the ability to change a particular behavior and to resist temptations to return to the previous behavior. Self-efficacy also involves the belief that the application of particular skills will lead to positive outcomes. DiClemente et al., 1991) concluded that self-efficacy increases as the individual moves through the stages of change. Temptation reflects the intensity of urges to engage in the problem behavior in a variety of related situations. Research results have identified three factors that reflect the most common types of tempting situations, including negative affect or emotional distress, social situations, and craving (Prochaska & Velicer, 1997). Temptation is viewed as the converse of self-efficacy; the same set of items is used to measure both self-efficacy and temptation, using different response formats. Decisional balance refers to an "individual's consideration of the pros and cons of change when deciding whether to make a behavior change" (Peipert & Ruggiero, 1998, p. 306). The balance between these pros and cons varies depending on which stage of change the individual is in. In the early stages, the disadvantages of changing the behavior outweigh the benefits of such change. As the individual moves toward the action stage, the importance of the benefits of changing, or pros, increases. This crossover in attitudes, when the cons of smoking outweigh the pros, generally occurs during either the contemplation or preparation stage (Fava et al., 1995).

The transtheoretical model also assumes the existence of other variables specific to the problem area under study, conceptualized as elements in the external or the internal environment. The external environment includes "interventions on the problem area, changes in the natural environment that affect behavior, such as a policy change,

or changes in the interpersonal environment" (Velicer, Rossi, Prochaska, & DiClemente, 1996, p. 557). The internal environment includes "personality characteristics, cognitive abilities, available monetary resources, and personal historic events that might impact on the problem area" (Velicer et al., p. 557). Included in this list of variables are cultural, socioeconomic, physiological, biochemical, and psychological factors specific to the behavior being studied.

An application of this model to smoking behavior is as follows. During precontemplation, an individual may not be aware of the harmful effects of smoking on self or others, or may deny these effects. In contemplation, the individual may seriously consider altering the behavior, but the cons of smoking cessation probably outweigh the pros—smoking may be pleasurable, stress reducing, or socially acceptable. In the preparation stage, the individual plans for the behavior change within the next month and may take small steps towards it; the individual may taper the number of cigarettes smoked per day or try to go for certain time periods without a cigarette. The action stage is evidenced by a definite change in behavior—smoking cessation—but the individual needs to constantly avoid temptations to smoke. During the maintenance period, smoking cessation has been achieved for at least six months, but temptation for relapse continues to exist.

Application of the Transtheoretical Model of Behavior Change

The core constructs of the TTM were first developed within the areas of psychotherapy and smoking cessation research (Fava, Velicer, & Prochaska,1995), and the theory is now the most widely used stage model in health psychology (Weinstein, Rothman, & Sutton, 1998). The TTM has been supported in a variety of behavioral problem areas and with a variety of populations, including clients in psychotherapy, alcoholism treatment, weight control programs, and head injury rehabilitation

(DiClemente et al., 1991). Research has been extended to other behaviors such as sun exposure and sunscreen use, exercise, mammography screening, adolescent delinquent behavior, radon exposure, HIV risk reduction, organizational change, medication compliance, unplanned pregnancy prevention, pregnancy and smoking, sedentary lifestyles, physicians practicing preventive medicine, and stress management (Prochaska & Velicer, 1997; Prochaska, Velicer, et al., 1994; Velicer et al., 1996). The TTM has advantages over other models because it includes people prior to behavior change, and also includes people who may have recently changed their behavior but still need support. Use of the TTM provides a way to identify and screen smokers across all stages of change, representing both smokers and recent quitters. By targeting smokers this way, it is possible to support maintenance of smoking cessation and relapse prevention (Ruggiero & deGroot, 1998), and also tailor interventions to promote change across all stages.

The theory itself has received rigorous testing in retrospective, prospective, cross-sectional, and longitudinal studies. The original constructs of the TTM have been redefined and revised, resulting in a theory that is applicable to a variety of health behavior situations and populations as noted above. Although the theory was initially developed in other disciplines, it has been validated and applied in several nursing research studies (Groner, Ahijevych, Grossman, & Rich, 2000; Miller, 1999).

One of the areas of the TTM needing further research is its application in describing, explaining, and predicting changes beyond the individual level, such as changes in couples and families (Prochaska et al., 1998). The TTM emphasizes the impact of internal and external environmental variables that effect change, such as social factors and social support. Two of these important variables are the pregnancy itself and the partner's smoking status. For this research study, the TTM was applied to

describe the smoking behavior of men whose partners were pregnant. Researchers have demonstrated that a partner's smoking status has an effect on the pregnant woman's smoking behavior. Pregnant women who live with a partner who smokes are less likely to quit smoking during pregnancy and more likely to relapse to smoking during postpartum than women who live with nonsmokers (McBride, Pirie, & Curry, 1992; Mullen, Quinn, & Ershoff, 1990). Pregnancy can influence changes in the health behavior of families by decreasing smoking consumption (Appleton & Pharoah, 1998; Brenner & Mielck, 1993; Hyssälä, Rautava, Sillanpää, & Tuominen, 1992; Ziebland & Mathews, 1998). An external event, such as pregnancy, may also change the stability of the stage process (Velicer et al., 1996), but it is not clear from existing data what factors motivate the individual to make a change. Most of the data related to male smoking behavior has been collected from a secondary source, such as the pregnant woman, rather than directly from the male. These studies have not used the TTM, and few have cited the use of any theoretical framework. The smoking behavior of men during pregnancy, within the context of other critical variables, can be described through utilization of the TTM in order to examine their specific stage of behavior change and motivation for change. Once their behavior is identified, health promotion interventions during the prenatal and postpartal periods can focus on stage-matched strategies designed to improve health benefits for all members of the family. The TTM has important implications for smoking cessation efforts. Unlike behavioral change approaches which target individuals ready to take action, i.e., quit smoking, the stages of change concept identifies smokers at various points of behavior change (Samuelson, 1997). The authors of the TTM view change as a process involving progress through a series of stages (Prochaska et al., 1998) as previously described.

The distribution of smokers among the stages of readiness to quit smoking has varied among samples, but it is estimated that for those people who continue to smoke, approximately 40 percent are in precontemplation, 40 percent in contemplation and 20 percent in preparation at any given time (Abrams, Herzog, Emmons, & Linnan, 2000; Curry, Grothaus, & McBride,1997; Fava et al., 1995; Velicer, Hughes, Fava, Prochaska, & DiClemente, 1995). In a nationally representative sample of current smokers in the United States, Clark et al. (1997) determined that there may be a higher percentage in precontemplation (60%), with lower percentages in contemplation (33%) and preparation (7%). In a comparison of pregnant and nonpregnant smokers, Ruggiero, Tsoh, Everett, Fava, and Guise (2000) found that both samples were very similar to the 40%-40%-20% distribution across the stages of change. This distribution was very different for those women in their first pregnancy, however, where 16.7% were in the precontemplation stage, 45.8% were in the contemplation stage, and 37.5% were in the preparation stage. These results for first-time pregnancies, however, are based on a sample size of 77 and should be interpreted with caution. In a sample of 495 predominantly low-income women attending prenatal, family planning, and well-child public health clinics, Crittenden et al. (1994) determined that 41% of the women were in the precontemplation stage, while 32% were in the contemplation stage and 27% were in the preparation stage. The stage of readiness, however, was higher for women who were pregnant.

Movement from one stage to the next can be facilitated through developmental and environmental forces (Prochaska, Velicer, et al., 1994). Developmental milestones may include events such as birthdays, marriage, childbirth, or illness. The external environment may include other people or social pressure. The TTM acknowledges that individuals not ready to change their behavior can be encouraged to do so through increased awareness and motivation prior to an actual behavior change (Clark et al.,

1997). Developmental and environmental forces, such as age milestones, childbirth, and social pressures to decrease smoking, can encourage movement from one stage to another (Prochaska, Velicer et al., 1994). The TTM is intended to explain 'intentional behavior change,' but several studies demonstrate that pregnant women stop smoking during pregnancy because of external, rather than internal, motivating factors. External factors, such as nausea related to pregnancy, social pressure not to smoke, and concern for the baby's health all contribute to cessation during pregnancy (Stotts et al., 1996).

The model also proposes that stage-matched interventions should be designed to move individuals from one stage to another (Clark et al., 1997; Prochaska et al., 1993; Ruggiero et al., 2000). These interventions also need to be enhanced through strategies and program content that are age-specific (Clark et al.).

The validity of constructs of the TTM has been primarily supported using samples from the general U.S. population. The TTM has received global support from researchers exploring self-change strategies during smoking cessation with a French-speaking population (Etter, Bergman, & Perneger, 2000; Etter, Perneger, & Ronchi, 1997).

The TTM also provides the basis for the development of a decisional balance measure for smoking cessation that is tailored for a diverse population of pregnant women (Bane, Ruggiero, Dryfoos, & Rossi, 1999). This tool has moderate internal consistency (α = 0.71 for general items, 0.64 for pregnancy-related items), but has only been used in one study to date. Breithaupt, Plotnikoff, Edwards, and Hotz, (2000) adapted the processes of change (POC) scale for use with prenatal and postpartal populations and determined its validity and reliability to be adequate. The alpha coefficients for the behavioral and experiential domains were 0.83 and 0.81,

respectively. Tests for discriminant and convergent validity identified a significant relationship between mean scores on the POC scale and stages of change.

Recently, a number of criticisms have been directed at the validity of the TTM. One concern is that the stages of change construct imposes an artificial and arbitrary categorization (Bandura, 1997; Etter & Perneger, 1999; Herzog, Abrams, Emmons, Linnan, & Shadel, 1999; Sutton, 1996) and an implied ordering or sequence. The TTM does not provide information about how long people stay in a particular stage nor does it describe when people change (Sutton). One limitation of the current research on the TTM is the lack of investigation of the manner in which the processes of change predict progressive stage movements (Herzog et al.; Sutton, 1996, 1997; Weinstein et al., 1998). These concerns may be related to limitations in current research, such as infrequent data collection, inadequate measurement of concepts related to the TTM and other variables such as self-efficacy, or self-selection of research participants in many of the studies (Abrams, 2000; Farkas et al., 1996; Herzog et al).

In summary, the TTM is a widely used, stage-based theory. Its utility has been supported by numerous studies (Prochaska et al., 1993; Prochaska, Velicer et al., 1994). Despite criticism and lack of consistent conclusions, this model provides an efficient means of categorizing smokers and the possibility of creating interventions that may meet the specific needs of individuals in each of those stages. Several researchers agree that continuing intervention research, using stage-specific and tailored interventions, needs to be carried out to determine the utility of the TTM (Stockwell, 1996). Current interventions using the TTM with the pregnant population have not been successful in sustaining cessation throughout the postpartal period. Further research is necessary to examine other factors that may play a critical role in postpartal relapse. The TTM, with its stages of change concept, is effective for use in population-based public

health approaches to smoking cessation because it is easy to use, can accommodate smokers at various levels of readiness to change their behavior (Abrams, 2000; Clark et al., 1997), and may provide a framework for more effective interventions (Sutton, 1997).

Measurement of Nicotine Dependence and Addiction

Dependence is a major construct in research on tobacco use and cessation, and is composed of both physical and behavioral components (U.S. DHHS, CDC, 2000). Some researchers have suggested the use of an addiction model as a more appropriate theoretical base for smoking cessation programs, investigating the smoker's level of addiction and quitting history as important factors in smoking cessation behavior (Farkas et al., 1996). Researchers suggest that the duration of previous quit attempts may also be an important determinant of future cessation success (Carlson, Taenzer, Koopmans, & Bultz, 2000).

Several assessment tools have been designed and used extensively in the assessment of tobacco dependence, but primarily measure physical addiction rather than behavioral dependence. These measurement tools include the Fagerström Test for Nicotine Dependence (FTND) (Heatherton, Kozlowski, Frecker, & Fagerström, 1991), and its predecessor, the Fagerström Tolerance Questionnaire (FTQ) (Fagerström, 1978; Fagerström & Schneider, 1989). The most serious limitation of the FTND cited by researchers is its lack of content validity, since it does not take into account important aspects of nicotine addiction such as the number of previous quit attempts or withdrawal symptoms (Etter & Perneger, 1999). The results of the FTND have been used to help determine the appropriate level of nicotine replacement therapy to prescribe using the transdermal patch (Andrews, Tingen, & Harper, 1999). These two assessment tools have been revised with the hope of increasing their psychometric properties or their predictive ability regarding smoking cessation.

Heatherton, Kozlowski, Frecker, Rickert, and Robinson (1989) developed the Heaviness in Smoking Index (HSI), using only questions related to timing of the first cigarette and the average number of cigarettes per day (CPD). The HSI was found to be an acceptable replacement for the FTND, but the authors suggested continued use of the FTND until further psychometric testing of the HSI could be done. The HSI was used for a sample of 819 pregnant smokers in a study examining perceived stress and depressive symptoms as correlates of smoking cessation (Ludman et al., 2000). Tate and Schmitz (1993) also proposed a revision of the FTQ to improve its psychometric properties and were able to do so by changes in item wording, scale format, and the addition and deletion of some items. These results also are limited because the study utilized a small sample of 182 outpatient substance abusers.

Kawakami, Takatsuka, Inaba, and Shimizu (1999) developed a 10-item questionnaire for the screening of tobacco/nicotine dependence based on current International Classification of Diseases (ICD) and Diagnostic and Statistical Manual of Mental Disorders (DSM) classifications. The reliability and validity of the tool was found to be adequate using three samples of smokers in Japan (n=406) and correlated moderately with the FTQ. To date, however, these revised or newly created tools have met with minimal usage in the research literature.

The goal of intervention using an addiction model would be to reduce addiction level through such activities as decreased smoking, switching to cigarettes with less nicotine, or waiting longer for the first cigarette of the day. Reduction of daily cigarette consumption is an activity compatible with the TTM since it is indicative of preparation for change (Crittenden et al., 1994). The concept of risk/harm reduction through decreased smoking, rather than complete cessation, is becoming more widely accepted in the research literature (DiClemente, Dolan-Mullen, & Windsor, 2000; Ershoff,

Solomon, & Dolan-Mullen, 2000; Etter & Perneger, 1999) as a strategy for those with low intentions to quit smoking. There is evidence to support reduced smoking rates as a beneficial alternative to cessation in the general population (Crittenden et al.) and during pregnancy (Windsor, Li, Boyd, & Hartmann, 1999), since reduction appears to enhance feelings of self-efficacy and motivation to quit (Crittenden et al).

Shiffman (1996) argues that both a stages of change model and an addiction model have "compatible and complementary roles to play" (p. 1290) in cessation research. The stages of change theory focuses on motivation and intention to change behavior, while nicotine addiction theory focuses on how hard it will be to change behavior and what type of assistance the person may need. For these reasons, many researchers use measurement tools from both models to conduct their research.

The Concept of the Smoke-Free Family

It is evident from research that all members of the family, including the newborn, are affected by the smoking behavior of adults in the household. Partner smoking is a critical factor in a woman's continuing to smoke during pregnancy, a return to smoking after childbirth for those who may have cut down or quit during pregnancy, and a source of environmental tobacco smoke. Current intervention efforts are underway to promote strategies that can create smoke free families (DiClemente et al., 2000). Most of the literature on smoking during the perinatal period focuses on the women's demographic variables, smoking behavior and addiction, related factors, and intervention strategies. The limited research on partner smoking behavior is presented to identify this area of needed research.

Smoking Behavior during Pregnancy

Data related to smoking during pregnancy have been compiled by U.S. federal agencies and researchers using large, population-based samples, but only include

statistics for women (Carmichael, Ahluwalia, & the PRAMS Working Group, 2000; Ko & Schulken, 1998). Date tabulated from the National Center for Health Statistics shows the rate of smoking by women during pregnancy has declined annually between 1990 and 1999. In 1999, over 12.3% of women giving birth reported smoking during their pregnancies, with the highest percentages (17.5%) occurring in the 15-19 years age range (Mathews, 2001). Smoking prevalence is also highest among mothers of greater socio-economic disadvantage. Figures for 1990 indicate that mothers living in the Midwest and in nonmetropolitan areas were more likely to report smoking during pregnancy than those mothers in other regions of the country or those living in metropolitan areas (LeClere & Wilson, 1997). These smokers are also more likely to be white and poorly educated.

Even though statistics identifying the prevalence of smoking by men during their partner's pregnancy are not available, information about the number of men who do smoke during pregnancy comes from a larger population of men in their young adult years. Data for 1999 indicated that 25.7% of all males were smokers. Of these, 29.5% were ages 18-24, and 29.6% were ages 25-44. The prevalence of smoking in males is highest among people who are American Indian/Alaska Native (40.9%), have less than a 12^{th}-grade education (42.4%), and are below the poverty level (37.1%) (CDC, 2001). Ershoff et al. (1999) conducted a study of three low-cost smoking interventions targeted to 332 pregnant women, but no differential intervention effects were found. Cessation rates among heavy smokers were very low in all of the intervention groups, and 55% of the women had partners who smoked. An intervention study emphasizing the health risks of ETS (n = 166) found these strategies had no impact on quit rate, cigarettes/day, or stages of change (Groner et al., 2000). Two thirds of the women in this sample lived

with a smoker, but they were drawn from a low-income population with a high rate of maternal smoking (38%).

Pregnancy, especially first pregnancy, is seen as a motivating factor in smoking cessation, generating changes in health behavior prior to pregnancy, during pregnancy, or after childbirth (Appleton & Pharoah, 1998; Brenner & Mielck, 1993; Crittendon et al., 1994; DiClemente et al., 2000; Orleans, Barker, Kaufman, & Marx, 2000; Ruggiero et al., 2000). In a study of 5724 pregnant women in Denmark, Olsen (1993) reported that 24% of smokers expecting their first child stopped smoking, compared with 15% in the other parity groups. In a study examining the smoking behavior of pregnant mothers and their partners in a sample of 530 women in Norway, Haug et al., (1992) determined that when compared to multiparae, nulliparae reduced their cigarette consumption to a greater extent and were more often encouraged to stop smoking by their partners. Such changes and motivating factors for fathers during pregnancy have not been studied as extensively as they have for women.

Research Variables and Methods Used to Address Partner Smoking During Pregnancy

Most of the research on the smoking behavior of men during their partner's pregnancy has employed a quantitative approach. There is a consistent relationship between the smoking status of pregnant women and their partners. In a review of the literature on smoking and pregnancy, however, Ziebland and Mathews (1998) noted that only 15 of 62 papers "considered the relationship between the partner's smoking status and the pregnant woman's smoking cessation or relapse" (p. 72).

Pregnant women who live with a smoker are less likely to quit smoking during pregnancy (Brenner & Mielck, 1993; Edwards & Sims-Jones, 1998; Lindqvist & Åberg, 1992; McBride & Pirie, 1990; McBride et al., 1998; Olsen, 1993; Severson et al., 1995; Wakefield et al., 1993) and are more likely to return to smoking during postpartum

(McBride et al., 1992; Mullen, 1999; Pollak & Mullen, 1997; Severson et al). For example, in a sample of 2,901 mothers who reported smoking one month prior to pregnancy, those women who continued to smoke throughout pregnancy were more than twice as likely to have a partner who smoked than were those who quit during pregnancy (Severson et al). Results from this study also indicated that women who relapsed soon after childbirth were almost four times as likely to have a partner who smoked than those who did not relapse. In a study designed to document families' efforts to minimize their infants' exposure to ETS, Ratner, Johnson, and Bottorf (2001) reported that 80% of the mothers whose partners did not smoke maintained smoke-free homes, compared to 71% of those whose partners smoked. A reduction in paternal smoking during pregnancy is positively associated with the mother's smoking cessation or reduction during pregnancy (Appleton & Pharoah, 1998; Hyssälä et al., 1992; Hyssälä et al., 1995; Waterson et al., 1990).

Other factors regarding smoking by men and women have been studied in addition to partner smoking status and pregnancy, but data are inconclusive about their impact on paternal smoking behavior. Age, occupation, and basic level of education were not significant factors in a study done in Finland (Hyssälä et al., 1992, 1995), but age and social class were positively associated with smoking prevalence in a British study (Waterson et al., 1990). Educational status was positively associated with smoking cessation among more highly educated men in a German study (Brenner & Mielck, 1993).

A qualitative study, using a focus group methodology, was done in Australia by Wakefield and Jones (1998) to explore the views of male partners of pregnant women about smoking. The authors' goal was to identify the breadth of experience regarding smoking during pregnancy and to identify themes that could be explored further using

quantitative methods. Issues that emerged from this study included the concern that health risks related to passive smoking, especially during pregnancy, were not widely known, but the men were concerned about exposing their newborn babies to passive smoke. The men acknowledged the effect of their own smoking on personal health, and that the women's attitudes toward smoking influenced their smoking behavior. They also viewed stress as a barrier to quitting smoking.

These themes have not been explored extensively with men during their partner's pregnancy, but some aspects have been identified indirectly in intervention studies of pregnant women. As a component of a smoking cessation intervention during routine antenatal and postnatal care in Australia, Wakefield and Jones (1998) provided advice and information to partners of pregnant women to assess the effect on the maternal and paternal smoking behavior during pregnancy and up to six months postpartum. Even though a significantly greater percentage of partners were reported as trying to quit in pregnancy in the intervention group (34%) than in the comparison group (14.9%), point prevalence quit rates did not differ between the two groups during pregnancy or postpartum. Wakefield and Jones concluded that such interventions may not affect partner quit rates but may "enable partners to be more supportive of women's cessation attempts, thereby increasing the likelihood of maternal cessation" (p. 319). Another study that included partners in its intervention component was the Project PANDA Study [Parents and Newborn Developing and Adjusting] (Mullen et al., 2001), a program designed to decrease rates of return to smoking among pregnant women who had stopped smoking. The male partner was sent video and print materials tailored to the male perspective on pregnancy (DiClemente, 2000) and designed to encourage the male partners to quit smoking and to protect their infant by reducing ETS in the home (Mullen et al.). Initial results indicate that the intervention made a small but significant

difference in smoking at three months postpartum (28% of the men nonsmoking versus 14% in the control group), but no differences at six or 12 months (DiClemente).

There are several limitations in these research studies on partner smoking behavior and cessation that limit the generalizability of their findings. One striking point about all of these studies that measured partner smoking status is that only a few indicated a recognized theoretical framework to direct the study. Mullen and colleagues (Mullen et al., 2001) utilized the TTM for their work in the Project PANDA Study. McBride et al. (1992) identified variables suggested by social learning and health belief models to predict postpartal smoking relapse. Several studies included a dichotomous question regarding partner smoking status (Johnson et al., 2000; Pollak & Mullen, 1997; Severson, 1995; Wakefield et al., 1993); others included level of smoking (Appleton & Pharoah, 1998; Hyssälä et al., 1992; Waterson et al.,1990). In four recent studies, paternal smoking status was reported by the pregnant women (Appleton & Pharoah, 1998; Olsen, 1993; Pollack & Mullen, 1997; Wakefield & Jones, 1998). Of the nine studies reviewed on the topic of paternal smoking, little research has been done with American families. The studies by Pollack and Mullen (1997) and Mullen et al. (2001) were carried out on samples of U.S. families; all 72 of the respondents in the 1997 study were married. Project PANDA was an intervention study using 522 study participants from three Texas health maintenance organizations. Six of the studies (Brenner & Mielck, 1993; Hyssälä et al., 1992, 1995; Lindqvist & Åberg, 1992; Wakefield & Jones, 1998; Waterson et al., 1990) used data that were 5-7 years old at the time of publication.

In summary, tobacco use and smoking cessation are issues that affect both partners and fetal/infant health during the perinatal period. Partner smoking behavior is a critical variable that needs to be considered, especially in intervention research, but it is often overlooked. Although some information is available about fathers and their

smoking behavior during pregnancy, most of this information has been obtained indirectly through reports from their partner; little is known about their profile in relation to the stages of change model. This research addressed this gap by using the Transtheoretical Model of Change to describe the smoking behavior of men living in northeast Minnesota and northwest Wisconsin whose partners are pregnant. This study extends previous research by using a tool (Bane et al., 1999) based on the TTM and designed for use during pregnancy in order to measure the pros and cons of smoking.

CHAPTER III

METHODOLOGY

Design of the Study

The purpose of this research was to describe the smoking behavior of men whose partners were pregnant using the transtheoretical model of change (Prochaska et al., 1998). A non-experimental, descriptive correlational design using self-report measures was used. The aim of this type of research design is to describe the relationship among variables rather than to infer cause-and effect relationships (Polit, Beck, & Hungler, 2001).

Setting and Sample

A convenience sample was recruited in the Midwest region at local childbirth preparation classes, at a healthcare provider's office, and at public health departments that provide services to prenatal clients through home visitation or have a Women, Infants, and Children (WIC) clinic (See Appendix A). At the time of the research, each of the childbirth preparation classes enrolled approximately 15-30 couples every 4-6 weeks. The major public health facility used had a caseload of approximately 90 prenatal clients for home visitation and 150 clients in the WIC clinic, although there was some overlap between these two groups. All males who smoked during their partner's/spouse's pregnancy and attended one of the selected childbirth education programs, men whose partners attended one of the childbirth education programs or visited their healthcare professional for a prenatal visit, and the partners of women who were visited at home or used the WIC Clinics were eligible to participate. Selection criteria included: male gender, 18 years of age and older; married to or living with a partner who was pregnant; and self-reported smoking activity of at least one cigarette per day at the current time or within one year of the date of the survey.

Power analysis indicated that a sample of approximately 100 individuals was necessary in order to be 95% confident that the sample proportion would not be different from the true proportion (population) by more than 10%, and to ensure recruitment of individuals who were at various stages of smoking behavior change. Convenience sampling limits the generalizability of research findings, but the results are useful in further research and in guiding development of interventions for smoking cessation. Because of the social undesirability of smoking, participation rates in this type of research tend to be low and attract primarily individuals who are willing to quit smoking at the time of the study (Personal communication, Dr. Cynthia Bane, March 20, 2000).

Materials and Method

An eight-page questionnaire consisting of several instruments was developed by the researcher to obtain data from participants. The instruments were pilot-tested for readability and clarity. The questionnaire took approximately 10-15 minutes to complete. Based on feedback from nurse researchers and men who smoked and pilot-tested the survey, an open-ended segment was added to the questionnaire asking respondents to provide any other information they would like to share about changes in smoking behavior they experienced during the pregnancy that may not have been captured in the other questions.

Instruments

Demographic variables.

A data collection tool was designed by the investigator to obtain information about selected participant demographics (See Appendix B). The demographic variables selected were used to determine the relationship of internal and external environmental variables to smoking behavior stages of change. Variables included age, occupation,

socio-economic status, marital and employment status, education, ethnic background, smoking status of female partner, and the number of children living at home.

Smoking Stage of Change.

Determination of the participant's stage of change for smoking behavior was based on the transtheoretical model developed by Prochaska and colleagues (DiClemente et al., 1991; Prochaska, 1996; Prochaska & DiClemente, 1983). The stage classification algorithm is mutually exclusive so that participants are classified into only one stage: precontemplation, contemplation, preparation, action, or maintenance. Individuals are classified into one of these five stages based on the response to a series of basic statements about their current or previous smoking behavior, their intention to quit smoking, and quit attempts in the past year (See Appendix B, question #11). Behavioral statements include: *I am currently a smoker, and do not intend to stop smoking in the next six months [precontemplation]. I am currently a smoker and am seriously considering quitting in the next six months [contemplation]. I seriously plan to quit smoking within the next thirty days and have made at least one attempt to do so within the past year [preparation]. I am a former smoker and have continuously quit for less than six months [action]. I am a former smoker and have continuously quit for longer than six months [maintenance].* The Stages of Change Measure has sound psychometric properties based on measures of reliability and stability using a quasi-simplex model (Morera et al., 1998). The Smoking Stages of Change algorithm has been used in numerous studies to classify current or previous smokers. These uses included 1,466 smokers who volunteered for a minimal intervention research project (DiClemente et al., 1991), 479 female caregivers who were smokers (Groner et al., 2000), and a comparison study of 103 pregnant smokers with 103 non-pregnant community women who smoked (Ruggiero et al., 2000).

Partner Smoking Status.

The smoking status of the pregnant partner was assessed using the following descriptors: *has never smoked; is an ex-smoker; smoked but quit during this pregnancy and not smoking now; quit smoking during this pregnancy but is smoking now; smokes but is trying to quit; smokes but is trying to cut down; smokes and is not quitting or cutting down* (modified from Cohen & Lichtenstein, 1990) (See Appendix B, question #10). In a study on agreement between self and partner reports of paternal drinking and smoking, Passaro, Noss, Savitz, Little, and the Alspac Study Team (1997) concluded that women's proxy reports of their partners' drinking and smoking status could be used with confidence, although agreement regarding the amount of smoking and drinking was reduced.

Fagerström Test for Nicotine Dependence.

Smoking behavior was assessed using the Fagerström Test for Nicotine Dependence (FTND) (See Appendix C). The FTND is a six-item self-report measure derived from the Fagerström Tolerance Questionnaire (FTQ) originally developed by Dr. Karl Fagerström to classify smokers according to their level of nicotine dependence (Heatherton et al,, 1991). Smoking behavior variables include smoking rate and length of time to first cigarette upon rising. Scores range from 0 (low nicotine dependence) to 10 (high nicotine dependence). The FTND has satisfactory internal consistency (Cronbach's *alpha* = .64) and high test-retest reliability (r = .88) (Pomerleau, Carton, Lutzke, Flessland, & Pomerleau, 1994) and its psychometric properties were verified in a factor analysis of 1309 FTQs (Radzius, Moolchan, Henningfield, Heishman, & Gallo, 2001). The measure has been employed in numerous studies, including application in a nurse practitioner-managed smoking cessation clinic (Andrews et al., 1999) and assessment of smoking behavior among depressed individuals (N = 231) (Lehman et al., 1998).

Pregnancy-tailored Decisional Balance Measure for Smoking Cessation.

The Pregnancy-Tailored Decisional Balance Measure was developed by Bane et al. (1999) and is based on the Decisional Balance Measure developed by Velicer, DiClemente, Prochaska, and Brandenburg (1985) (See Appendix D). According to the TTM, an individual's perception of pros of smoking decrease and perception of cons of smoking increase as the individual moves through the stages of change toward cessation (Bane et al.). Designed for use during pregnancy, the tool measures perceived pros and cons of smoking behavior but also incorporates pregnancy-related pros and health-related cons. The 12-item tool uses a 5-point Likert scale, ranging from 1) *not important* to 5) *extremely important.* Scores range from 12-60. Sample items include, "I am relaxed and therefore more pleasant when smoking;" "I'm embarrassed to have to smoke." The two pregnancy-related items were re-worded for use with the male sample in this study. For example, the item "It's too hard for me to quit while pregnant" was changed to read, "It's too hard for me to quit while *my partner is* pregnant." The measure has moderate internal consistency with an *alpha* of .71 for general items and .64 for pregnancy-tailored items (Bane et al.). The measure was recently developed and to date has only been used in one study of 281 low-income pregnant women who attended a public maternity clinic (Bane et al.).

Situational Temptation Inventory [Short Form].

The Situational Temptation Inventory was developed by DiClemente et al. (1985) from a longer tool of self-efficacy and measures dimensions of tempting smoking situations: positive/social, negative/affective, and habit/addictive (Velicer et al., 1990) (See Appendix E). The short form contains nine questions; participants indicate how tempted they are to smoke in each of the situations on a 5-point Likert scale (1-*Not at all tempted* to 5-*Extremely tempted*). Sample items include, "When I am extremely anxious

and stressed;" "With my spouse or close friend who is smoking." The measure has demonstrated satisfactory internal consistency (Cronbach's *alpha* = .88 - .93) (Fava et al., 1995). The instrument has been used in a comparison of pregnant and nonpregnant smokers (Ruggiero et al., 2000), application of the TTM to a large (*N* = 1,144) representative sample of smokers (Fava et al.), and 207 women in various stages of smoking behavior change (Stotts, DiClemente, Carbonari, & Mullen, 1996).

Processes of Change [Short form].

The Processes of Change Inventory was developed by Prochaska, Velicer, DiClemente, and Fava (1988) to measure the frequency of 10 specific techniques or activities individuals use when they attempt to modify a problem behavior (Prochaska et al., 1993) (See Appendix F). Prochaska and DiClemente (1983) demonstrated that different processes are used in different stages of change. The ten processes of change are divided into two broad categories. Experiential processes are activities related to thinking about quitting smoking and include consciousness raising, self-reevaluation, dramatic relief, environmental reevaluation, and social liberation. Behavioral processes are techniques useful during smoking cessation and include counter conditioning, stimulus control, reinforcement management, self-liberation, and helping relationships. The short form contains 20 items and was derived from the long-form tool. There are two items for each of the ten processes of change. The subject is presented with a list of activities that smokers frequently employ while changing their smoking behavior. The subject is asked to rate the frequency of these events on a 5-point Likert scale of 1) *never* to 5) *repeatedly*. Scores range from 20-100; frequencies are summed for each of the 10 processes. Sample items include: "I get upset when I think about my smoking;" "I am rewarded by others if I don't smoke." The tool has an acceptable level of consistency, with Cronbach's coefficient *alpha* of 0.69-0.92 calculated on each of the 10

two-item subscales (Perz et al., 1996). The short-form instrument was developed from the long form using a pool of 970 participants, approximately equally divided into the five stages of change (Prochaska et al., 1988), and reconfirmed using a sample of 870 smokers. The tool has been used extensively in smoking cessation research, including a large (N = 4,144) representative sample of smokers in a smoking intervention study (Fava et al., 1995), a comparison of 206 pregnant and non-pregnant smokers (Ruggiero et al., 2000), and 1390 participants in a worksite-based cancer prevention study (Herzog et al., 1999).

Methodological Issues

Some methodological issues that could have influenced the validity of this study were the reliance on self-reported smoking behavior and the presence of other confounding factors. Smoking during pregnancy is socially undesirable and may lead to under-reporting of smoking behavior. Gestational or health problems may not be detectable in this type of study and may have impacted the level of stress of both partners. To increase the likelihood of participation, participants received a $5.00 coupon redeemable at all Target stores for their participation. The questionnaire was available only in English. Those participants who desired to complete the questionnaire but may have experienced language or other difficulty were encouraged to ask for assistance from a health care provider or the researcher. Participants made no requests of this nature.

Procedures

Data Collection

Childbirth preparation classes.

The researcher made a presentation to the class attendees, inviting those eligible to participate in the research. The packets of research materials containing the cover

letter, questionnaire, postage-paid return envelope and postcard were placed in the rear of the classroom. Those who were willing to participate could then pick up the materials. If women in attendance had a partner who smoked but was not present at the classes, they were encouraged to pick up the packet and take it home. Each packet contained a self-addressed, stamped envelope for postal return of the questionnaire to the researcher. Because of the limited time available during the childbirth classes, participants were told to complete the questionnaire at home and mail it to the researcher. Participants were encouraged to return the questionnaire within one week.

Healthcare provider's office.

The researcher explained the purpose of the research and procedures for data collection to the nurse practitioner (NP) who oversaw the prenatal care of clients in a local healthcare provider office. The NP received packets containing the cover letter, questionnaire, postcard and return envelope. The NP ascertained whether the woman's spouse/partner was eligible for participation in the study. If appropriate, the NP gave the packet to the pregnant woman and asked to have her spouse/partner complete the questionnaire and return it to the researcher within one week.

Public Health Department and WIC Clinics.

The researcher explained the purpose of the research and procedures for data collection to the public health nurses (PHNs) who visited clients for prenatal care or who staffed the Women, Infants, and Children (WIC) Clinic. The PHNs received packets containing the cover letter, questionnaire, postcard and return envelope. The PHN gave the materials to those men who met the eligibility criteria and agreed to participate in the study. If the male spouse/partner was not present at either the WIC Clinic or the home visit, the PHN ascertained whether the woman's spouse/partner was eligible for the

study, gave a packet to the woman, and asked to have her spouse/partner return the questionnaire to the researcher in the return envelope within one week.

For participants in the childbirth preparation classes, healthcare provider office, and the Public Health clinic or home visit program, there was no opportunity to identify which potential participants received the questionnaire but did not return it. There was no means for follow-up with any of these individuals.

Data Management and Analysis

Data management and analysis were carried out using the Statistical Package for Social Sciences (SPSS) (SPSS, 2000). Either the researcher or statistician coded data on questionnaires and performed data input and analysis. Demographic data were analyzed using descriptive statistics such as measures of central tendency, *chi*-square and *t*-tests as appropriate. Age, marital status, employment, ethnic background, and education were reported using frequencies and percent. The variables of age, number of children at home, and gestational age were recoded into ranges. Identification of the subject's stage of change was determined and then reported by frequency and percentages. The processes of change were scored by summing the two items for each of the ten processes, then grouping them into their higher-order categories of experiential and behavioral processes, and summing again to yield a score for each category. Temptation was scored by summing all items in the scale, yielding one score. Decisional Balance (pros and cons) was scored by summing items for each of the subscales. Raw scores were converted to standard *T* scores ($M = 50$, $SD = 10$) to facilitate interpretation and comparisons. Sample size limited the use of inferential statistics, such as *t*-tests and analysis of variance (ANOVA), to comparison of these variables across groups by stage of change. These tests were done as appropriate if sufficient group size by stage of change was reached. Fisher's least significant

differences (LSD) post-hoc test was used as the follow-up procedure for tests where significant main effects were found. Nicotine dependence using the Fagerström Test for Nicotine Dependence was identified by summing the response items (#14-19 on the questionnaire) according to the point scale developed by the tool's creator. Results were considered significant at a level of $p = .05$.

Protection of Human Participants

Approval for the study was obtained from the Institutional Review Board of the University of Minnesota, Minneapolis (Appendix G) and the respective committees for the protection of human participants at all agencies referring study participants. These included St. Mary's/Duluth Clinic Health System (Appendix H), and St. Luke's Hospital and Regional Trauma Center (Appendix I). Letters of approval were obtained from Carlton County Public Health Department and Northland Medical Associates (See Appendix J). The study's purpose, procedures, risks, benefits, and the subject's right to confidentiality and withdrawal from the study were explained to each subject by the researcher or agency staff. Code numbers were assigned to all forms for data collection purposes only. The public health nurses, childbirth educators, and the staff of the health provider's office did not know which of their clients returned the questionnaires.

CHAPTER IV

FINDINGS

Results of the statistical analyses based on data gathered from a sample of 74 participants are reported in this chapter. Potential participants were recruited primarily from childbirth classes, Women, Infants, and Children (WIC) clinics, and health care provider offices. Because of this recruitment strategy, it is not possible to determine the overall rate of smoking in this population. A total of 225 questionnaires were distributed, however, which indicates a return rate of approximately 30%. Data collection took place over a nine-month time frame. The number of responses varies slightly for some of the statistical analyses because of missing data for some of the variables. First, the demographic characteristics of these 74 participants are described, followed by the data analyses that address the research questions. An alpha level for significant differences was set at .05.

Characteristics of the Sample

The sample for this study consisted of 74 men with pregnant partners. Their ages ranged from 18-45, with a mean of 27 years (*SD* = 5.8). Just over half (57%) were married. Most of the sample (96%) was of white, non-Hispanic ethnic background. Almost 80 percent of the sample (*n* = 63) had a minimum of a high school diploma or equivalent education. Most of the sample were employed either full-time (78%) or part-time (4%), although 18% were not employed at the time of the survey. Family income ranged from less than $5,000 (7%) to $50,000 or more (19%), with average family income reported in the range of $15,000-25,000. Over two-thirds (n = 52) of the couples were in the third trimester of pregnancy at the time of participation, while the remaining 22 couples were evenly divided between the first and second trimesters. Approximately

65% of the couples did not have any children living in their households, and 27% averaged 1-2 children currently living with them (see Table 1).

Table 1 Demographic Characteristics of the Sample (*N*=74)

Variable*	PC	C	PR	A/M	TOTAL	χ^2	*p*
Age							
18-24	10	9	4	4	27		
25-34	10	17	6	7	40		
35 and older	1	4	2	-	7		
Total	21	30	12	11	74	4.18	.652
Education							
Some high school	5	3	2	1	11		
Diploma/GED	7	13	4	4	28		
Some college/tech.	5	9	5	4	23		
Associate degree	3	3	-	1	7		
Bachelor's degree	-	2	1	-	3		
Advanced degree	1	2	1	1	2		
Total	20	28	12	11	74	10.38	.798
Ethnic Background							
White, non-Hispanic	20	28	12	11	71		
African-American	-	1	-	-	1		
Hispanic	-	1	-	-	1		
American Indian	1	-	-	-	1		
Total	21	30	12	11	74	5.52	.787
Employment Status							
Full-time	16	23	8	10	57		
Part-time	1	2	-	-	3		
Not employed	4	4	4	1	13		
Total	21	29	12	11	73	4.34	.631
Income							
<$10,000	6	5	1	-	12		
$10,000-24,999	9	9	3	2	23		
$25,000-49,999	6	10	3	5	24		
$50,000 or more	-	6	5	3	14		
Total	21	30	12	10	73	14.52	.105
Marital Status							
Married	8	17	8	9	42		
Single	13	13	4	2	32		
Total	21	30	12	11	74	6.28	.099
Children in Household							
No Children	13	20	6	8	47		
1-2 Children	6	8	3	3	20		
3 or more Children	1	1	3	-	5		
Total	20	29	12	11	72	15.55	0.21

*PC-precontemplation; C-contemplation; PR-preparation; A/M-Action/Maintenance

Stages of Change in Smoking Behavior

The stage classification algorithm developed by Prochaska and colleagues to determine stage of change was used to classify the participants (Prochaska & DiClemente, 1983). The 21 participants in the precontemplation stage (PC) were smoking and stated they were not serious about quitting smoking in the next six months. Their average age was 26, only one third were married, most worked full-time, and just over 50% had a minimum of a high school education. They started smoking at age 14-15, smoked for approximately 11 years, and most smoked about 11-20 cigarettes per day.

The 30 participants in the contemplation stage (C) were smoking but seriously considering quitting within the next six months. Their average age was 28, slightly over one half were married, and most worked full-time. While almost one half had a high school education, another one third had 1-2 years of college or technical school education. These men started smoking at the age of 16, smoked for 11.5 years, and half of these men smoked 11-20 cigarettes per day.

The 12 participants in the preparation stage (PR) were planning to quit smoking within the next month and had made at least one serious quit attempt within the past year. Their average age was 28, and two-thirds were married and worked full-time. Half of the group had a minimum of a high school education. These men started smoking at 16 years of age and smoked for almost 12 years; most of them smoked 11-20 cigarettes per day.

The stages of change (SOC) classification also includes two groups of non-smokers. The seven participants in the action stage (A) were former smokers who had continuously quit for less than six months. Their average age was 28. The four

participants in the maintenance stage (M), like those in the previous stage, were former smokers, but had continuously quit for more than six months. Their average age was 23.

In summary, the sample for this study consisted of 74 men in each of the five stages of behavioral change for smoking. While 63 of the 74 participants (85%) continued to smoke during their partner's pregnancy, 42 of these men (57%) were seriously considering quitting smoking in the next six months. In order to maximize the number of participants in the various stages of change, the action and maintenance stages were collapsed into one category identified as action/maintenance (A/M).

Chi-square analyses were calculated to compare the socio-demographic characteristics of these men across the SOC. These analyses indicated that there were no significant associations for the variables of age, ethnic background, educational level, employment status, income level, and marital status (see Table 1).

Level of Nicotine Dependence

In addition to classifying men by their stage of change, smokers were classified according to their level of nicotine dependence using the Fagerström Test for Nicotine Dependence (FTND) (Heatherton et al., 1991). The number of participants for each of the variables comprising the FTND as a function of stage is shown in Table 2. Of 58 smokers, 40 (69%) had very low- to low nicotine dependence, while 8 (14%) had moderate nicotine dependence. The remaining 10 participants who smoked (17%) had high or very high nicotine dependence. Although participants in each group of smokers had varying levels of nicotine dependence, the differences were not significant, χ^2 (8, N = 58) = 3.995, p = .858. Results of chi-square analysis of scores for five of the six individual variables indicated that the groups had no significant association in terms of the timing, frequency, amount, and daily smoking behaviors. The one significant result, χ^2 (2, N = 60) = 8.49, p = .014, was in response to the question, "Which cigarette would

you most hate to give up?" A Kruskal-Wallis test was conducted comparing the responses to this question for participants in each of the stages of change. No significant difference was found (H (1) = .092, p > .05), indicating that the groups did not differ significantly from each other. The smoker's stage of change did not seem to influence which cigarettes the smoker would hate to relinquish the most.

Table 2 Nicotine Dependence and Smoking Characteristics Across Stages of Change

Variable	PC	C	PR	Total	χ^2	*p*
Nicotine Dependence (Fagerström Index)						
Very Low	7	11	4	22		
Low	3	11	4	18		
Medium	2	4	2	8		
High	4	3	1	8		
Very High	1	1	-	2		
Total	17	30	11	58	3.99	.858
Time to First Cigarette						
5 minutes	6	4	1	11		
6-30 minutes	8	8	6	22		
31-60 minutes	1	10	1	12		
> 1 hour	5	8	3	16		
Total	20	30	11	61	9.99	.125
Difficult to Refrain						
Yes	4	3	-	7		
No	17	27	11	55		
Total	21	30	11	62	2.71	.258
Which cigarette hate to give up						
1st one in AM	5	18	2	25		
All others	14	12	9	35		
Total	19	30	11	60	8.49	.014*
Cigarettes/day						
10 or less	7	12	4	23		
11-20	11	14	7	32		
21-30	2	3	-	5		
31 or more	1	1	-	2		
Total	21	30	11	62	2.19	.901
Smoking frequency						
1st hours after waking	6	8	4	18		
Rest of day	14	22	7	43		
Total	20	30	11	61	.367	.832
Smoke when ill						
Yes	6	7	4	17		
No	14	23	7	44		
Total	20	30	11	61	.75	.688

PC-precontemplation; C-contemplation; PR-preparation
* Significant at $p < .05$ levels

Processes of Change

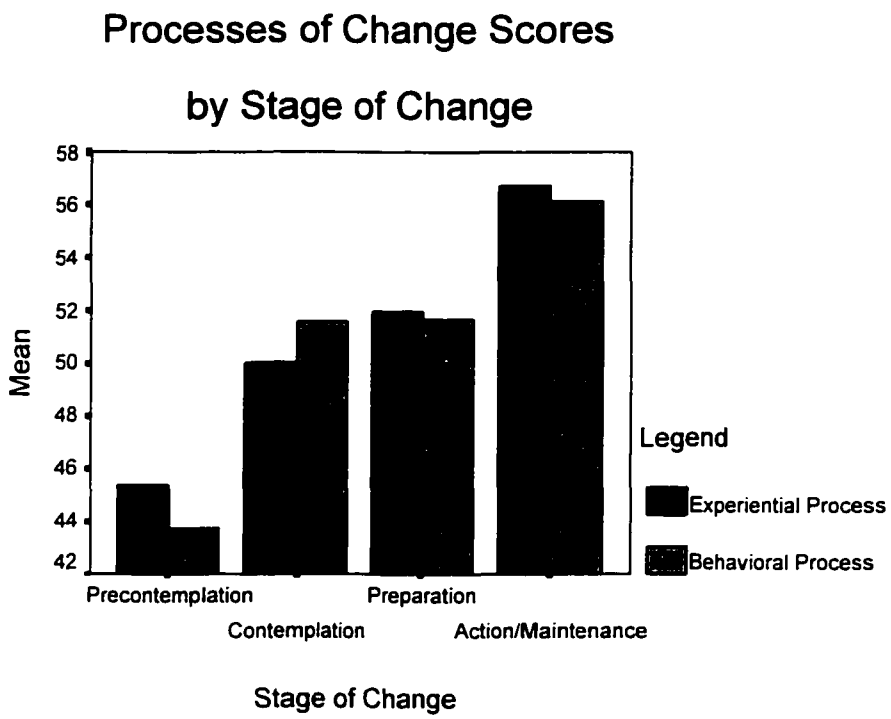
The Processes of Change (POC) tool measures ten experiential and behavioral activities that smokers often employ in the process of cessation. See Table 3 below for a description of each of the processes of change (Prochaska et al., 1993).

TABLE 3 Processes of Change

Process of Change	Description
Consciousness raising	Seeking new information about problem behavior
Dramatic relief	Experiencing and expressing feelings
Environmental reevaluation	Assessing how problem behavior affects environment
Self-reevaluation	Reappraisal of values with respect to behavior
Social liberation	Environmental support for behavior
Counter-conditioning	Substitution of alternatives for behavior
Helping relationship	Using support of others
Reinforcement management	Rewarding oneself or being rewarded by others
Self-liberation	Making a commitment to change
Stimulus control	Control of situations and other causes which trigger the behavior

The POC Scale asks participants to rate the frequency of smoking-related events during the last month on a scale of 1 (*never*) to 5 (*repeatedly*). Overall, the PC group was least active and the A/M group most active in their use of the processes of change (see Figure 1). Comparison of mean scores among the stage of change groups for the POC subscales indicated significant differences between groups for both the experiential POC, F (3, 71) = 2.98, p = .038, and the behavioral POC F (3, 69) = 5.033, p = .003. An examination of the mean scores in Table 4 indicates that the PC group used experiential POC significantly less often than the A/M group, p = 0.005. The PC group also used the behavioral POC significantly less often than did the C, PR, and A/M groups.

Figure 1



T scores for groups representing the stages of change are presented on each of the ten POC (see Table 4). The two statements representing the experiential process of social liberation had the highest means: "I notice that non-smokers are asserting their rights," $M = 3.45$, $SD = 1.21$. "I find society changing in ways that makes it easier for non-smokers," $M = 3.37$, $SD = 1.29$. The two statements representing the behavioral process of stimulus control had the lowest means and thus were experienced the least by participants during the last month. "I keep things around my home or place of work that remind me not to smoke," $M = 1.52$, $SD = .84$. "I remove things from my home or place of work that remind me of smoking," $M = 1.73$, $SD = 1.07$.

Further analysis of the mean scores for each of the five behavioral POC revealed some significant differences among the stage groups for two of these processes: self-liberation, $F(3, 72) = 5.81$, $p = .001$, and counter-conditioning, $F(3, 71) = 11.17$, $p <$

.001. The process of self-liberation, described as "both the belief that one can change and the commitment and recommitment to act on the belief" (Prochaska & Velicer, 1997, p. 40), was used less by the PC group than by those in C, PR, or A/M. The process of counter-conditioning, which "requires the learning of healthier behaviors that can substitute for problem behaviors" (Prochaska & Velicer, p. 40), was used significantly more by those in A/M than by those in all three other groups, p=<.001.

The mean scores for two other behavioral processes failed to reach significance but did show a possible trend toward differences between groups. The process of contingency, or reinforcement management, was used more by participants in PC than those in PR. The process of stimulus control, e.g. removing prompts for unhealthy behavior and using cues for healthier ones, was used more by participants in PC than those in A/M groups.

Examination of three of the experiential POC also revealed some differences between groups. The process of self-reevaluation involves "both cognitive and affective assessments of one's self-image with and without" an unhealthy behavior (Prochaska & Velicer, 1997, p. 40). The difference in mean scores for this process was significant, F (3, 72) = 2.75, p = .049, with participants in A/M using this process more than participants in PC or in C. Consciousness-raising involves an increased awareness about the problem behavior. This process was used more by participants in A/M than participants in PC. The process of dramatic relief, which involves experiencing and expressing feelings related to the behavior, was used more by participants in C and A/M than participants in PC. Although the mean scores for the last two processes differed between the groups, the differences were not significant.

Table 4 Processes of Change Across the Stages of Change

Variable	Stage of Change					
	PC (n=21)	C (n=30)	PR (n=12)	AM (n=11)		
	M (SD)	M (SD)	M (SD)	M (SD)	F	***Post-hoc comparisons
Experiential Processes Total	45.8 (8.1)	50.0 (10.0)	52.0 (10.3)	56.0 (10.6)	2.977*	PC<AM
Consciousness raising	46.6 (7.9)	50.2 (10.6)	50.5 (10.8)	55.3 (10.0)	1.926	PC<AM
Dramatic relief	45.2 (7.2)	51.2 (10.1)	51.9 (10.5)	54.1 (11.7)	2.670	PC<C PC<AM
Environmental re-evaluation	47.5 (8.7)	50.2 (11.3)	51.0 (9.9)	53.3 (8.8)	0.875	ns
Self-reevaluation	47.0 (8.6)	48.4 (9.8)	53.9 (8.8)	55.5 (12.0)	2.752*	PC<AM C,AM
Social liberation	47.9 (12.1)	50.0 (9.0)	50.1 (8.6)	53.9 (9.6)	0.863	ns
Behavioral Processes Total	43.7 (7.1)	51.7 (9.3)	51.7 (9.2)	56.2 (12.3)	5.033*	PC<C<PR<AM
Counter-conditioning	44.2 (8.4)	50.4 (8.4)	48.1 (7.2)	62.0 (9.4)	11.174**	PC<C<AM PR<AM
Helping relationship	46.7 (8.6)	51.8 (11.1)	48.2 (8.1)	50.4 (10.5)	1.189	ns
Reinforcement management	46.5 (7.5)	50.0 (10.9)	54.3 (8.9)	52.1 (12.0)	1.764	PC<PR
Self-liberation	43.4 (9.4)	51.5 (8.6)	52.5 (6.4)	56.0 (12.2)	5.810*	PC<C<PR<AM
Stimulus control	45.9 (6.1)	50.6 (11.1)	52.2 (8.6)	54.2 (12.6)	2.159	PC<AM

PC - Precontemplation; C - Contemplation; PR - Preparation; AM - Action/Maintenance.
*$p < .05$. **$p < .001$. ns = not significant
***Post-hoc comparisons were made using Fishers' LSD test. Comparisons that were significant are shown using a < symbol.

Situational Temptation

The Temptation Scale measures the level of temptation when the urge to smoke is felt in various situations. Comparisons of stage by level of temptation were performed using standardized mean *T* scores with ANOVAs. These comparisons demonstrated no significant differences among SOC groups on the subscales of habit/addictive, positive/social, and negative/affective, or on the total temptation score (see Table 5). Even though these temptation scores were not significantly different among groups, a comparison of the means indicated that overall temptation decreased across stages of change. The one subscale where this pattern did not hold true was in the subscale of negative/affective temptation, where participants in PR (M = 50.9, SD = 8.3) were more tempted in negative/affective situations than those in contemplation (M = 48.4, SD = 9.6).

The two most tempting situations were 'with friends at a party', where 58 participants (78%) were very or extremely tempted to smoke, and 'when anxious and stressed', when 57 participants (77%) were also very or extremely tempted to smoke. The least tempting situation was identified as 'when I feel I need a lift', where 41 participants (55%) felt little or no temptation to smoke.

Table 5 Situational Temptation Across Stages of Change

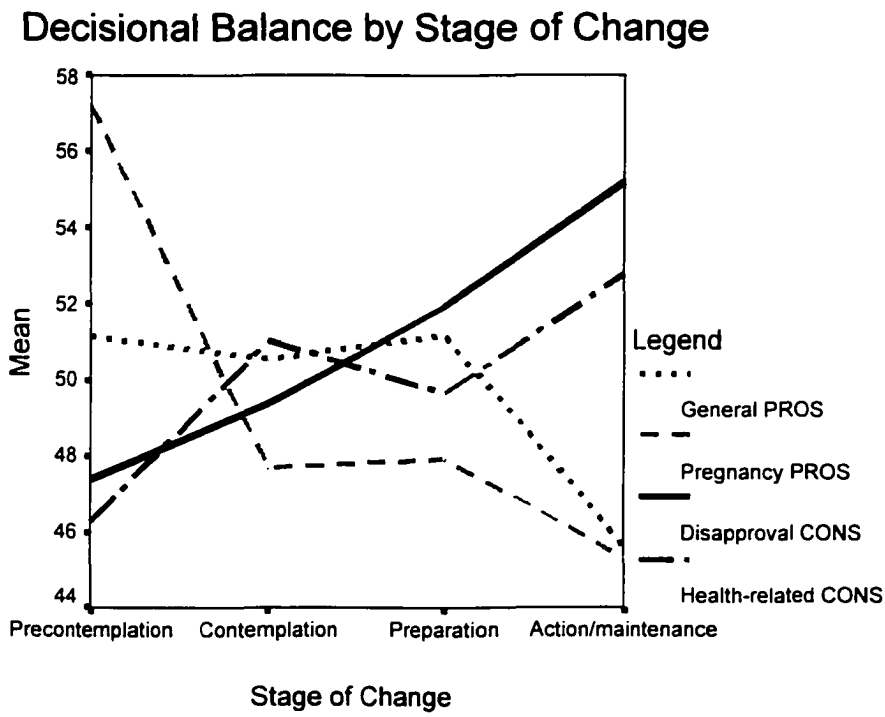
Variable	*Stage of Change*				
	PC (n=21)	C (n=30)	PR (n=12)	AM (n=11)	
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*F*
Temptation					
Positive	52.0 (8.4)	50.1 (10.7)	49.4 (9.4)	46.7 (12.0)	.66
Negative	53.6 (8.4)	48.4 (9.6)	51.0 (8.3)	46.3 (14.0)	1.73
Habit	52.8 (8.4)	51.3 (9.3)	47.5 (10.0)	43.9 (12.7)	2.48
Total	53.3 (7.9)	50.0 (10.0)	49.1 (8.6)	44.6 (13.4)	1.91

PC - Precontemplation; C - Contemplation; PR - Preparation; AM - Action/Maintenance.
Note: All comparisons were made using standardized *T* scores (*M* = 50, *SD* = 10).

Decisional Balance

Decisional balance, or the weighing of the positive (pros) and negative (cons) aspects of a health behavior, is another critical component in behavior change. Scores were examined on the four subscales and the overall pros and cons of the Pregnancy-Tailored Decisional Balance Scale to assess for differences in means among the SOC groups. Significant differences emerged between the PC participants when compared to both the C and A/M groups, indicating that the positive aspects of smoking decreased across groups as their smoking behavior changed. (See Figure 2)

Figure 2 Decisional Balance Scores by Stage of Change



One-way ANOVAs indicated that the stage effect was significant for the Pros scale, F (3, 72) = 4.26, p= .008, but not significant for the Cons scale, F (3, 71) = 1.96, p = .129 (See Table 6). Post hoc LSD tests indicated that the positive aspects of smoking

were more important in the decision to smoke for the men in PC than they were for men in the C or A/M groups. Mean scores for the cons of smoking increased across groups as the negative aspects of smoking became more important in the decision to quit smoking.

Table 6 Decisional Balance Across Stages of Change

Variable	*Stage of Change*					
	PC (n=21) *M (SD)*	C (n=30) *M (SD)*	PR (n=12) *M (SD)*	AM (n=11) *M (SD)*	*F*	***Post-hoc comparison*
Decisional Balance *PROS*	55.7 (10.7)	48.4 (8.9)	49.4 (7.5)	44.2 (9.6)	*4.26	PC<C PC<AM
General	51.5 (9.7)	50.1 (9.7)	51.2 (7.4)	45.6 (13.4)	.91	ns
Pregnancy	57.7 (8.9)	47.4 (8.3)	47.2 (8.1)	45.3 (10.8)	**7.59	PC<C<PR <AM
Decisional Balance *CONS*	46.5 (9.3)	50.0 (9.47)	51.1 (10.4)	55.2 (10.9)	1.96	ns
Disapproval from others	47.5 (9.5)	49.4 (10.3)	51.1 (9.5)	55.1 (10.0)	1.54	ns
Health-related concerns	46.3 (9.1)	51.3 (9.0)	50.5 (11.0)	52.8 (12.4)	1.42	ns

PC - Precontemplation; C - Contemplation; PR - Preparation; AM - Action/Maintenance.
Note: All comparisons were made using standardized *T* scores (*M* = 50, *SD* = 10).
* p < .05. ** p < .001. ns = not significant
***Post-hoc comparisons were made using Fishers' LSD test. Comparisons that were significant are shown using a < symbol.

One-way ANOVAs performed on each of the four subscales indicated that the stage effect was significant for the pregnancy-related pros, F (3, 73) = 7.59, p = .001. LSD tests indicated that men in PC placed more importance on the pregnancy-related pros than did those men in the three other groups. Means for the three other subscales—general pros, cons related to disapproval from others, and health-related cons—did not differ significantly across SOC.

Multivariate ANOVA using mean T scores was carried out on the individual scale items across SOC; there was a significant effect of SOC for several of these items. Both pregnancy-related pros were highly significant, and post-hoc LSD tests indicated that men in PC had higher perceptions of the pregnancy-related pros of smoking than did men in all three other groups of SOC. The first item, "Cigarettes help me relax and I couldn't give that up while my partner is pregnant," was rated significantly higher for men in the PC group compared to all other groups, F (3, 73) = 5.417, p = .002. The second pregnancy-related item, "It's too hard for me to quit while my partner is pregnant," was also highly significant, F (3, 73) = 8.146, p <.001.

Only one of the individual items on the Cons scale was statistically significant: "I am embarrassed to have to smoke." Men in PC were less embarrassed to smoke than were those men in all three other categories F (3, 73) = 3.92, p = .012.

All of the other individual items did not differ significantly across the SOC, although the item, "I am more relaxed and therefore more pleasant when smoking," approached significance, F (3, 70) = 2.72, p = .051. Men in the preparation stage rated this item to be moderately important when compared with the rating of those in the action/maintenance stage.

Even though their mean scores were not significantly different across groups, both items addressing the health-related cons of smoking, "Smoking cigarettes is

hazardous to my health" and "I know of the increased risk of medical problems such as cancer", were identified as being 'very important' by 73% of the sample.

Relationship of Partner Smoking

Another research question explored the association between the smoking status of the female partner who was pregnant and that of her partner. In this sample of men who smoked during their partner's pregnancy, 47% of the men reported that their female partners either never smoked (n = 18) or were ex-smokers (n = 17). A total of 21.6% of the female partners (n=16) quit during the pregnancy and were not currently smoking. Three female partners had quit but were smoking at the time of the survey (4%), and 16 women (21.6%) continued to smoke but were trying to quit or cut down. The remaining four women (5%) continued to smoke without a change in their behavior.

The woman's smoking status was recoded into two categories of 'smoking' and 'not smoking' for further comparisons. The number of women smoking and not smoking as a function of their partner's stage of change is shown in Table 7. Although more fathers who smoked had partners who smoked, the difference was not significant, $\chi^2(3, 74) = 5.47$, $p = .14$. However, of the 11 men who were no longer smoking, 10 of their partners were either ex-smokers or had never smoked. Of those 21 men who were in the precontemplation stage and did not intend to quit smoking, 10 had female partners who continued to smoke during pregnancy, while only five female partners had quit during pregnancy and were currently not smoking. Of the 42 men who were thinking about quitting smoking in the next 1-6 months, half of them had female partners who had never smoked or were ex-smokers; an additional 9 of these men had partners who quit during pregnancy and were currently not smoking.

Table 7 Partner Smoking Behavior

Variable	PC	C	PR	A/M	TOTAL	χ^2	*p*
Father Smoking Status	21	30	12	11	74		
Mother Smoking Status							
Never smoked	2	8	5	3	18		
Ex-smoker	4	8	-	5	17		
Quit, not smoking now	5	6	3	2	16		
Quit but smoking now	-	2	1	-	3		
Smokes, trying to quit	3	2	-	1	6		
Smokes, cutting down	4	3	3	-	10		
Smokes	3	1	-	-	4		
Total	21	30	12	11	74	21.53	.253

Additional Findings

An open-ended question was included on the survey to elicit comments from the participants. Of the 28 respondents, most of the men stated that they currently do not smoke around their partner or other children for health reasons or because of the odor associated with smoking. Six of the men smoke only outdoors. Two of the respondents said they did not plan to smoke around the new baby. For some, smoking was used as a means to deal with the stress associated with pregnancy or as a means of relaxation. The level of smoking increased for one couple because they spent more time sitting around at home watching television because of the pregnancy.

CHAPTER V

DISCUSSION

The overall purpose of this research was to describe the smoking behavior of men whose partners were pregnant using the constructs of the transtheoretical model of change (TTM) and other variables. In this chapter the findings of the current research are discussed in relation to other research efforts on this topic. Limitations of the study and recommendations for nursing practice and future research are presented.

Summary of Findings

The sample consisted of 74 men with pregnant partners, recruited in two Midwestern states of the United States. Their ages ranged from 18-45, with a mean of 27 years (*SD* = 5.8); 57% were married. The majority of the sample was white, had a minimum of a high school education or its equivalent, and worked full-time. Over two-thirds of the couples were in their third trimester of pregnancy at the time of the survey, and almost two-thirds did not have any children living in their household.

This sample included 74 men in various stages of behavior change for smoking: 21 (28%) in the precontemplation stage, 30 (41%) in the contemplation stage, 12 (16%) in the preparation stage, 7 (9%) in the action stage, and 4 (5%) in the maintenance stage. While 63 (85%) of the participants continued to smoke during their partner's pregnancy, 42 of these men (57%) were seriously considering quitting smoking within the next six months. The groups did not differ significantly in terms of socio-demographic characteristics across the stages of change.

Men in all stages of change used both the experiential and behavioral processes of change, but in varying frequencies. The precontemplation group utilized the processes of change the least, while the combined action/maintenance group utilized the processes of change the most. The experiential process of social liberation, which

reflects societal assertion of rights by non-smokers, had the highest means and therefore was experienced frequently by smokers within the last month prior to their study participation.

The positive aspects of smoking decreased, while the negative aspects of smoking increased, as individuals progressed through the stages of change toward cessation. Some men felt that they were not able to quit smoking during their partner's pregnancy. The two health-related negative aspects of smoking, which address the hazards and medical problems related to cancer, were identified as being very important by 73% of the sample. The overall temptation to smoke decreased among groups as persons indicated more intent to stop smoking or had stopped smoking. There were no significant differences among groups in their temptation to smoke. The two most tempting situations were 'with friends at a party' and 'when anxious or stressed.' Over two-thirds of the sample had very low- to low nicotine dependence. There were no significant differences in level of nicotine dependence by stage of change.

Over two-thirds of the female partners (n = 51) were not smoking at the time of the survey, while the remaining 23 women continued to smoke during pregnancy. A total of 16 women had quit smoking during the pregnancy and were not smoking at the time of the survey. More of the men who smoked had partners who continued to smoke during pregnancy when compared to the men who were no longer smoking.

Discussion of the Findings

Participant Characteristics and Smoking Prevalence

This sample was representative of the population in this geographical region with respect to ethnicity and socio-economic status. However, the sample is not representative of the overall U.S. population and thus limits the generalizability of the findings of this study (CDC, 1997; CDC, 2000a). The region has an overall white

population of 94-96%, 57-59% of individuals are aged 18-64, and 10-12% of individuals have income below the poverty level. Cigarette usage for these states averages 22% for men and 17% for women. Cigarette smoking in the U.S. in 1998 by persons aged 18-44 years averaged 30% for men and 25.5% for women (CDC, OSH, 2001), which indicates decreased smoking rates on the regional level when compared to these national averages. The sample figures are also consistent with overall smoking rates in the region, where smoking behavior is negatively correlated with income and educational level.

The mean Fagerström Score for Nicotine Dependence in the current sample was 3.33 (*SD* = 2.25), which indicates very low dependence when compared to the normative mean score of 5-7 points (on a 10 point scale) (Fagerstrom & Schneider, 1989). This low level of dependence may be attributable to the fact that addiction is declining among smokers in general (Fava et al., 1995), and that smokers are interested in decreasing their tobacco use. It is also possible that non-participants were more nicotine dependent and less motivated to participate in the study.

Readiness to Change Smoking Behavior

Knowing where persons are located along the continuum of behavior change can assist nurses and other healthcare professionals to plan appropriate interventions. The findings in this study are generally comparable to those from other studies, which indicate that most people who smoke are in the early stages of behavior change (Prochaska, Norcross & DiClemente, 1994; Prochaska, Velicer, et al., 1994). However, more smokers in this study were in the contemplation stage (48%) than is typically seen in other studies. For smokers in the U.S., the typical distribution (in percentages) across the first three stages of change is 40-40-20 (Abrams et al., 2000; Curry et al., 1997; Fava et al., 1995; Velicer et al., 1995; Velicer & Prochaska, 1999). This increased

percentage of smokers in the contemplation stage may also account for the lower level of nicotine dependence in this sample, since addiction levels decrease across the stages of change continuum. It is hypothesized that impending parenthood may have prompted some to consider stopping smoking.

Whereas the stages of change indicate *when* shifts in attitudes or behavior occur, the processes of change (POC), described as general coping activities, help determine *how* these shifts occur. Other studies have demonstrated that successful progress through the stages of change (SOC) requires appropriate use of the various processes of change at each stage (DiClemente et al., 1991; Perz et al., 1996; Prochaska et al., 1993). Generally, people in the contemplation and preparation stages tend to use the experiential processes, which involve primarily cognitive and affective activity. Examples of some of these activities include raising one's awareness about the behavior and its effect on the environment and other people, experiencing feelings about the possible consequences of the unhealthy behavior, and noticing social changes that may help support the behavioral change. People in the action and maintenance stages tend to emphasize the behavioral processes, which are more active strategies (Prochaska,1991). Examples of these activities include creating a system of rewards for positive behavior change, finding social support to assist with the change, making a commitment to change such as a New Year's resolution, learning new alternative behaviors to substitute for the old behavior, or avoiding environmental cues such as social situations that may foster the negative behavior.

Participants in the action and maintenance stages in this study used both the experiential and behavioral processes to the same extent. The reasons for this phenomenon are not clear, since the experiential processes, except for social liberation, usually reach their greatest degree of usage in the contemplation or preparation stage

(Prochaska,1991). Participants in the action/maintenance group, as expected, emphasized the behavioral processes of self-liberation and counter-conditioning to a significant degree. Self-liberation, making the commitment to change, is consistent with a smoker's change to non-smoking behavior; counter-conditioning represents the use of alternatives for smoking such as relaxation. Participants in the action/maintenance group, when compared to all other groups, also emphasized the behavioral process of stimulus control, which involves removing cues for unhealthy habits. The use of nicotine replacement therapy by individuals in the action/maintenance group is an appropriate example of one way to emphasize their increased use of the process of change called counter-conditioning. The increased use of reinforcement management by the preparation group, which involves self-reward or rewards from others for making changes, may indicate partner support for positive changes in smoking behavior although this aspect was not directly addressed in this study. Recognition of this process of change then leads to further reinforcement of this behavior change by self-reward or rewards from others.

These findings on the stages and processes of change have important implications for the development of intervention strategies to address smoking behavior. Many smoking intervention programs are designed for individuals ready to take action to quit smoking (the preparation stage). Such a mismatch between program and readiness to quit smoking leads to unsuccessful smoking cessation. Interventions similar to those being developed for the general population of smokers need to be developed for this specific group that are stage-matched to fit their needs and level of motivation to change their smoking behavior.

Environmental Factors Associated with Behavior Change

In addition to the processes of change, the TTM assumes the existence of other independent variables specific to the behavior change area under consideration. These independent variables are conceptualized as involving either the internal or the external environment. According to Velicer et al. (1996), the internal environment includes personality characteristics, cognitive abilities, financial resources, and personal historic events. The external environment includes any interventions on the problem area, changes in the natural environment that may alter behavior, or changes in the interpersonal environment that lead to behavior change. Both developmental milestones and environmental factors often initiate modifications in health-related behaviors and may facilitate movement through the stages of behavior change (Prochaska, Norcross, et al., 1994; Velicer et al., 1996).

One key element of the behavior change process that has received less attention in smoking cessation research is that of motivation, or 'why' individuals change. One criticism of the TTM is that it does not identify when, or under what circumstances, people change their behavior (Sutton, 1996). The use of the model of intrinsic-extrinsic motivation developed by Curry and colleagues (Curry et al., 1997) could fill this gap by addressing specific factors that motivate individuals to change their behavior. Intrinsically motivated behaviors, such as a concern for health, are driven by the desire to achieve internal personal rewards. Extrinsically motivated behaviors are in response to external rewards or punishments and may include reinforcement and social influence.

Pregnancy itself, seen as a developmental milestone, may prompt changes in smoking behavior. This factor may be responsible for the variation in the stages of change seen in this study when compared to other nationally representative samples as noted earlier. Even though studies documenting the shift across stages of change for

men during pregnancy are not available, pattern shifts across the stages have been documented for women. In a study of 495 pregnant women, Crittenden et al. (1994) determined that pregnancy status was positively related to readiness to change, both in the entire sample and among Black women. Batten, Graham, High, Ruggerio, and Rossi (1999) described 'first-time pregnancy' as having an intervention-like effect on women who smoke, and Olsen (1993) found that 24% of smokers expecting their first child stopped smoking compared with 15% in other parity groups. Likewise, Ruggiero et al. (2000) reported that pregnant smokers in their first pregnancy seemed to be more motivated to quit smoking than non-pregnant smokers. Haug et al. (1992) in a study of 2379 Norwegian women, determined that first-time mothers reduced their cigarette consumption to a greater extent that did multiparous women and were more often encouraged to stop smoking by their partners. The same phenomenon may be true for first-time fathers, since smokers in this study expecting their first child were more likely to be contemplating quitting smoking than smokers with one or more children, or those smokers in the general population. This finding suggests that greater efforts to motivate fathers to quit smoking prior to or early in the first pregnancy must be carried out.

Two dimensions of intrinsic motivation identified in the research by Curry et al. (1990) included health concerns and self-control. Regardless of their stage of change, participants in the current study acknowledged that smoking was detrimental to their health. Almost three-fourths of the sample identified the negative aspects of smoking as being 'very important' in their decision-making regarding smoking. In an analysis of data from the 1992 National Health Interview Survey—Cancer Control Supplement, Clark and Maclaine (1997) determined that agreement with statements about the harms of smoking was positively associated with readiness to quit smoking among all smokers despite their age.

Stress can be a major factor in smoking. Maintaining a non-smoking environment is a constant challenge, and the dynamic relationship between stress and smoking behavior must also be taken into consideration. As noted by several participants in the open-ended portion of the survey, stress was identified as a reason to smoke, similar to comments found by Wakefield, Reid, Roberts, Mullins, and Gillies (1998) in their qualitative study carried out in Australia. Consistent with other studies, smokers in the current study found they were more tempted to smoke in situations involving emotional distress or negatively charged experiences (Britt et al., 2001), and felt they could not give up smoking during the pregnancy. Overall level of stress has been shown to be a predictor of relapse after smoking cessation during pregnancy (Cohen, 1990; Faue, Folen, James, & Needels, 1997), and may also be a critical factor in the temptation to smoke experienced by these men. Even though the overall temptation to smoke decreased across the stages of change, those participants in the action/maintenance stage were more tempted to smoke when compared to those in other studies (Fava et al., 1995; Velicer et al., 1990).

Two dimensions of extrinsic motivation identified by Curry et al. (1990) included immediate reinforcement and social influence. Participants in this study, particularly those in the action and maintenance groups, reported using the experiential process of social liberation, which involves external environmental supports for behavior change. This finding is in direct contrast to the results of Prochaska and DiClemente (1983), where the action group used this process the least. Currently in the region, smoking in eating establishments is restricted and other regulatory initiatives are underway to restrict restaurant smoking in neighboring communities. In addition to the local emphasis on smoke-free environments, increased public awareness and media attention on smoking behavior in the 20 years since the Prochaska and DiClemente study may also

reflect the important role of public environmental support for cessation activities and changing social norms. As noted in the Surgeon General's Report on Tobacco Use and other documents (U.S. DHHS, CDC, 2000b), current research efforts indicate the association between local smoking restrictions and smoking prevalence, and that smoking bans are the most effective measure for reducing ETS exposure.

To summarize the key factors associated with behavior change, these results indicate that pregnant women and their partners may be more motivated to quit smoking and more receptive to smoking cessation advice and assistance during a developmental milestone such as pregnancy (Velicer et al., 1996). Individuals have greater contact with the healthcare system during prenatal/postnatal care and may be receptive to interventions related to smoking cessation. Healthcare professionals can take advantage of increased motivation to quit by reinforcing the positive aspects of quitting for all family members and by providing cessation information to the father, as well as to the pregnant woman. Whereas this motivation for smoking cessation is most evident during the couple's first pregnancy, healthcare professionals, nevertheless, must advise parents in subsequent pregnancies to quit smoking as well. Environmental factors that support behavior change include a concern for health, public regulation of smoking, and increased public awareness of the effects of smoking. Consistent with the results of other studies, smoking is viewed as a mechanism to cope with stress while a change in smoking behavior is perceived as leading to an increase in stress; therefore, alternative means to cope with stress need to be offered if smokers are to successfully stop smoking.

It is apparent from the literature that smokers with higher levels of intrinsic motivation relative to their level of extrinsic motivation have a greater success in smoking cessation (Curry et al., 1990; Curry et al., 1997). A change in smoking behavior

during pregnancy brought about because of external, rather than internal motivating factors, may not result in the use of appropriate coping activities, i.e. processes of change, at levels necessary for successful, long-term smoking cessation. DiClemente and Prochaska (1998) describe the temporary cessation of smoking by pregnant women as the temporary suspension of a behavior rather than intentional, long-term behavior change. These results have been found to lead to high rates of smoking relapse after pregnancy for pregnant women (McBride, Pirie, & Curry, 1992; Stotts et al., 1996) and may be true for men also (Hyssälä et al., 1995). Even though the male may stop smoking during pregnancy because of a concern for his health or that of the mother and infant, the stress of a new baby in the household and lack of effective coping skills may lead to a relapse of smoking. The added stimulus of a partner who smokes may lead to further temptation. Nurses can assist by teaching alternative coping skills.

Maternal Smoking and its Relationship to Partner Smoking

The social environment and social support are important factors in stopping smoking and maintaining a smoke-free environment. The prevalence of smoking and quit rates among pregnant women varies from 20-40% depending on group demographic characteristics such as age, ethnic group, and parity (Batten et al., 1999; DeVries & Backbier, 1994; Fingerhut et al., 1990; McBride et al., 1990; Ruggiero & deGroot, 1998; Waterson et al., 1990). Rates of maternal smoking during pregnancy in 1999 averaged 22-26% in this Midwest region and 12-18% statewide. The smoking rate of women during pregnancy in this sample was similar to these findings. However, the figure of 23 women (31%) who continued to smoke at the time of this survey is substantially higher than the 12.3% estimate of births to all white mothers who smoked in the U.S. in 1999 (Mathews, 2001). Since most quitting is reported in the first trimester of pregnancy (Haug et al., 1992; Owen, McNeill, & Callum, 1998; Ruggiero & deGroot;

Severson et al., 1995), these figures are probably fairly accurate as half of the women were in their third trimester at the time of the survey. These prevalence and quit rates are also fairly consistent with those of Severson et al. (1995) in a study of 2901 women who smoked prior to pregnancy. Their study indicated that 35% of mothers reported quitting smoking during pregnancy, while 52% had cut down for pregnancy.

The strongest predictor for continued smoking by women throughout pregnancy is the smoking status of the husband/partner (Appleton & Pharoah, 1998; Haug et al., 1991; Hyssälä et al., 1992; Lindqvist & Åberg, 1992; McBride et al., 1999; Olsen, 1993; Severson et al, 1995; Wakefield et al., 1993; and Waterson et al., 1990). Even though statistical analysis indicated no significant relationship between the smoking status of the men and women in the current study, these results indicate a trend in this direction. In this study, 37% of the men who smoked had partners who were still smoking during pregnancy, a finding similar to other studies. The smoking behavior of both partners is a critical issue, since a partner who smokes may create social pressure to smoke, along with being a ready source of cigarettes and a constant stimulus for smoking. Women perceived less support for quitting from partners who smoked than from non-smoking partners (McBride et al., 1998); this reciprocal relationship may also have operated in this study to lessen support for quitting.

These conclusions have serious implications for further study and interventions with men who smoke during their partner's pregnancy. Few studies have attempted to influence the smoking behavior of men of pregnant partners. Those studies, which have incorporated the male partner, have achieved little success in changing the men's smoking behavior (Pollack & Mullen, 1997; Wakefield & Jones, 1998).

The results related to these environmental factors have several implications for practice and research. The healthcare setting provides an opportunity for professionals

to incorporate clinical practice guidelines for smoking cessation into their routine care. The recent update of clinical practice guidelines for smoking cessation (Fiore, 2000) indicates that the use of a screening system to identify smokers triples clinical intervention. Based on the 5A's model of 'ask, advise, assess, assist, and arrange' developed in these guidelines, interventions designed to curb smoking during pregnancy should address not only the smoking behavior of the mother but also the male partner as well. Viewed as the fifth vital sign, the smoking status of both partners should be assessed and documented periodically in the mother's prenatal health record. If both parents are available during prenatal visits, they could receive advice and information about the effects of smoking and environmental tobacco smoke on themselves and on the infant. Even though nicotine replacement therapy is not generally recommended for women during pregnancy, its use may be appropriate for the woman's partner in order for him to reduce or stop his smoking. Since many pregnant women stop smoking before their first prenatal visit, these spontaneous quitters should also receive continual monitoring and support. In one managed care environment, Lando et al. (2001) noted that lack of such monitoring of women who quit smoking during pregnancy resulted in a return to smoking in 27% of women. Even minimal clinical interventions of less than three minutes have been shown to be effective in increasing smokers' motivation to change their smoking behavior and are cost-effective (U.S. DHHS, CDC, 2000a; Ershoff et al., 1990).

Intervention programs must be designed to focus on smoking cessation for both partners, since they are a source of both stimuli and support for each other. Both partners must also learn to use effective stress management techniques when faced with the additional stress of the newborn. The only project to date with this focus is the work of Mullen et al. (2001) through their Project PANDA (Parents and Newborns

Developing and Adjusting), a program designed to decrease rates of return to smoking among pregnant women who have stopped smoking. This intervention program addressed partner smoking by sending video and print materials on smoking behavior geared toward the male perspective during pregnancy. The program achieved small but significant success in smoking by men at three months postpartum, but no differences at six and twelve months. Because of the high rate of relapse, monitoring of smoking behavior must continue throughout the postpartal period and during well-baby visits to emphasize relapse prevention, cessation, and the need to avoid infant exposure to ETS. These findings highlight the need to target men as well across all stages of change for intervention.

Use of the Transtheoretical Model of Change

The results of this study support the use of the TTM for understanding some key aspects of the smoking behavior of men whose partners are pregnant. The patterns of the model's variables across the stages of change were generally consistent with those of other studies. However, in many of the studies using the TTM there has been little exploration of the role of the internal and external environment. Consistent with other studies that have addressed the role of environmental factors in smoking behavior, the results of this study indicate that pregnancy, and particularly the first pregnancy, viewed as a developmental milestone, triggers a change in the smoking stage of change for males whose partner is pregnant. In a qualitative study using 120 participants, Etter et al. (2000) determined that events such as pregnancy prompt changes in smoking behavior, in particular from the precontemplation to the contemplation stages of change. This same phenomenon occurred in the current study, accounting for the increased percentage of participants in the contemplation stage.

The classification of smoking behavior according to stages provides clear direction for stage-specific healthcare interventions, but the motivational factors that prompt behavior change specific to this population need to be identified and integrated into the model. The newly developed Pregnancy-Related Decisional Balance Tool, based on the transtheoretical model, was modified for use with male participants in this study to determine the pros and cons of smoking during pregnancy. Internal consistency values were generally moderate (general pros $\alpha = .63$, pregnancy-related pros $\alpha = .89$, disapproval from others cons $\alpha = .60$, health-related cons $\alpha = .78$) and are fairly consistent with those produced during tool development. The one major area of difference occurred in the category of pregnancy-related pros, where the internal consistency values in the current study were substantially higher (pregnancy-related pros, $\alpha = .89$) than those in Bane's original work ($\alpha = .69$). The pregnancy-related pros subscale in this study indicated that an individual's stage of change was significant in determining the pros and cons of smoking. Overall, the tool was not useful in differentiating behavior among groups according to the TTM but warrants further testing.

Limitations of the Study

Several limitations of this study must be noted. The small sample size, the homogeneity of the group, and the use of convenience sampling limit the generalizability of these findings. The use of a cross-sectional, rather than a longitudinal, design limits documentation of any long-term behavior changes. Recruitment of participants took place in health care settings and thus the sample may include participants who were generally more interested in improving their health habits. Most of the participants were recruited at childbirth education classes, which tend to attract couples expecting their first child, and thus the number of first-time parents was larger than expected. The number of persons who declined to participate was not recordable, leaving no way to

evaluate participation bias. The fact that 30-50% of prenatal class participants took the questionnaire home, even though they may not have completed it, suggests that a large percentage of male attendees at prenatal classes smoke. Smoking behavior was documented through self-report without any biochemical validation, and smokers may have provided what they deemed to be socially desirable responses to the survey questions. However, based on previous research and the 1990 Surgeon General's Report (U. S. DHHS, 1990), Velicer and Prochaska (1999) supported the claim that validation of self-report measures was no longer necessary in most research studies of smoking cessation. Information on the smoking habits of the pregnant women was obtained by proxy report from the male and may include some inaccurate reporting. In a study of agreement between self and partner reports of paternal drinking and smoking, however, Passaro et al. (1997) determined that women's proxy reports of their partners' status can be used with considerable confidence.

Implications for Further Research

Success in reducing tobacco use is an important health goal but one that remains one of the greatest challenges of the 21st century. The use of a comprehensive approach, including educational, clinical, regulatory, and economic interventions and comprehensive statewide programs, is urgently needed. Research efforts specific to the smoking behavior of men during their partner's pregnancy is needed to address each of these avenues.

First, further validation of the current findings is necessary in order to fully understand the smoking behavior of men during their partner's pregnancy. Use of a larger sample size with varying socio-demographic characteristics is warranted to determine differences in these variables. It is also necessary to determine if men whose partners are pregnant differ from male smokers in the general population, and what

factors motivate these expectant fathers to change their smoking behavior. It may then be possible to create brief, tailored, stage-matched intervention activities that fit their specific needs and to test their effectiveness in this specific population. The geographic nature of this study may allow results to be used to influence program and policy objectives in the local region.

Second, there is also a critical need to address the roles of the healthcare provider and the overall healthcare system in the provision of best-practice interventions for smoking cessation. Only 49% of obstetricians/ gynecologists routinely advise smoking cessation for their smoking patients (Orleans et al., 2000) and many health plans do not provide reimbursement for smoking cessation interventions during pregnancy. Those smokers who have the greatest addiction to smoking have the least access to cost-effective smoking interventions (CDC, 2001). Because of the interdependence of mothers and fathers on smoking behavior and the effect of environmental tobacco smoke on infants, research efforts need to focus on effective ways to incorporate interventions in perinatal care directed at both partners, especially if both smoke.

The role of social support and partner behaviors that support quitting have been investigated (Cohen & Lichtenstein, 1990; Pollack et al., 2001; Pollack & Mullen, 1997) but the appropriate types of social support need further exploration. As noted by Pollack et al., couple-based interventions could improve couples' communication and increase appropriate supportive behaviors. Couple-based interventions where nurses assess stage-specific readiness of each partner and fit the intervention to the appropriate process of change should be tested.

Last, efforts to promote smoke-free environments, i.e. automobiles and homes, also need to be developed in order to provide non-smoking family members with

effective mechanisms to encourage smokers to quit. One avenue of further research would be for nurses to work with graphic artists to design visual cues for cars and homes as motivational prompts to refrain from smoking in these locations.

Each of these further research efforts will add significantly to the body of knowledge regarding smoking cessation in this specific population and will enable researchers to develop effective interventions as part of a comprehensive approach to support tobacco control.

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APPENDICES

Appendix A

November, 2001

Dear Potential Study Participant:

You are invited to be in a research study of the smoking behavior of men whose partners are pregnant. You were selected as a possible participant because your spouse/partner is pregnant and you indicated that you smoke. Please read this letter and ask any questions you may have before completing the survey.

I am a doctoral candidate at the University of Minnesota, School of Nursing. The purpose of this study is to determine the smoking behavior and selected characteristics of men whose partners are pregnant. I am asking you to complete the enclosed survey with questions about yourself and your smoking habits. It will take approximately 10-15 minutes to complete and can be done at your convenience.

Although this study will not benefit you directly, I would appreciate your participation in this project. It is hoped that this information will help us better understand the smoking behavior of men during the time of pregnancy. One benefit of completing the questionnaire is that your participation may help others in the future as a result of knowledge gained from this research.

There are no known risks to participation in this study. There is the potential that some of these questions may make you feel uncomfortable. Please call the researcher or one of the persons listed at the end of this letter if that should happen and you feel the need to talk to someone.

To thank you for your participation in this study, I would like to send you a gift certificate for $5.00 that can be used at any Target store. Once you have completed the questionnaire, please write your name and address on the postcard included with the research materials and send it to me. Please mail it separately from the questionnaire—do not put the postcard in the envelope.

The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject.

Your participation in this study is voluntary. If you decide to participate, you are free to withdraw at any time. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota or St. Luke's.

You may ask any questions you have now. If you have questions later, you may contact me at [redacted]. You may also contact my advisor, Dr. Mariah Snyder, at [redacted] you have any questions or concerns regarding the study and would like to talk to someone other than the researcher, contact Dr. James Anderson, Human Studies Research Committee chair, 915 East First Street, Duluth, MN 55805; telephone [redacted]

Sincerely,

Mary Tanner, RN, MS, MSE
Principal Investigator
Doctoral Candidate
University of Minnesota
HSC #: 0008M59882

Appendix B: Questionnaire Part I

PART I: The purpose of this questionnaire is to learn about the smoking behavior of men when their spouse/partner is pregnant.

Instructions: *Please answer the questions below by putting your answer in the space provided or checking the appropriate box.*

Do not write on this side

1. Age _____ ____ ____

2. Occupation _____ _____

3. Employment status: ☐

   ☐ Full time
   ☐ Part time
   ☐ Currently not employed

4. Marital status: ☐

   ☐ Married
   ☐ Single

5. Ethnic background: ☐

   ☐$_1$ White, Non-Hispanic
   ☐$_2$ African American
   ☐$_3$ Asian or Pacific Islander
   ☐$_4$ Hispanic
   ☐$_5$ American Indian
   ☐$_6$ Other (specify) _____

6. Education: ☐

   ☐$_1$ Less than 9th grade
   ☐$_2$ Some high school
   ☐$_3$ High school diploma or GED
   ☐$_4$ Some college/technical program
   ☐$_5$ Associate degree: 2 years
   ☐$_6$ Bachelor's degree: 4 years
   ☐$_7$ Graduate or professional degree

7. Number of children under 18 years of age living in the household: _____ ___ ___

8. Family Income
   - ☐ 1 Less than $5,000
   - ☐ 2 $5,000 to $9,999 ☐
   - ☐ 3 $10,000 to $14,999
   - ☐ 4 $15,000 to $24,999
   - ☐ 5 $25,000 to $34,999
   - ☐ 6 $35,000 to $49,999
   - ☐ 7 $50,000 or more

9. When is your baby due? _____ _____

10. Which of the following statements best describes the current smoking status of your spouse/partner? ☐
    - ☐ 1 She has never smoked
    - ☐ 2 She is an ex-smoker
    - ☐ 3 She quit smoking just before this pregnancy but smoking now
    - ☐ 4 She smoked but quit during this pregnancy and is not smoking now
    - ☐ 5 She quit smoking during this pregnancy but is smoking now
    - ☐ 6 She smokes but is trying to quit
    - ☐ 7 She smokes but is trying to cut down
    - ☐ 8 She smokes and is not quitting or cutting down

11. Your current smoking status: Which one of the following statements best describes your smoking status: ☐

☐ 5 I am a former smoker and have continuously quit for longer than six months.

☐ 4 I am a former smoker and have continuously quit for less than six months.

☐ 3 I seriously plan to quit smoking within the next 30 days and have made at least one attempt to quit within the past year.

☐ 2 I am currently a smoker and am seriously considering quitting in the next six months.

☐ 1 I am currently a smoker, and do not intend to stop smoking in the next six months.

Appendix C

Fagerström Test for Nicotine Dependence

If you currently do not smoke, you have completed this part of the questionnaire. Please continue with Part II of the questionnaire.

If you do smoke, please continue to complete the rest of Part I and then complete part II of the questionnaire.

For current smokers only:

12. How old were you when you started smoking? _____ ___ ___

13. In the last year, how many times have you quit smoking for at least 24 hours? _____ _____

14. How soon after you wake do you smoke your first cigarette? ☐

- ☐$_1$ Within 5 minutes
- ☐$_2$ 6-30 minutes
- ☐$_3$ 31-60 minutes
- ☐$_4$ more than one hour

15. Do you find it difficult to refrain from smoking in places where it is forbidden, e.g., in a church, at the library, in the movie theater? ☐

- ☐ Yes
- ☐ No

16. Which cigarette would you hate most to give up? ☐

- ☐ The first one in the morning
- ☐ All others

17. How many cigarettes a day do you smoke? ☐

- ☐$_1$ 10 or less
- ☐$_2$ 11-20

❒$_3$ 21-30
❒$_4$ 31 or more

18. Do you smoke more frequently during the first hours after waking than during the rest of the day? ☐

❒ Yes
❒ No

19. Do you smoke when you are so ill that you are in bed most of the day? ☐

❒ Yes
❒ No

Today's date _____

PLEASE CONTINUE WITH PART II

Appendix D

Pregnancy-Related Decisional Balance Measure

Instructions: The following statements represent different opinions about smoking. Please rate HOW IMPORTANT each statement is to your decision to smoke according to the following five point scale:

5=Extremely important 4=Very important 3=Moderately important

2=Slightly important 1=Not important

	Extremely important 5	Very important 4	Moderately important 3	Slightly important 2	Not important 1
1. Smoking cigarettes relieves tension.	5	4	3	2	1
2. Smoking helps me to concentrate and do better work.	5	4	3	2	1
3. I am relaxed and therefore more pleasant when smoking.	5	4	3	2	1
4. Smoking cigarettes is pleasurable.	5	4	3	2	1
5. Cigarettes help me relax and I couldn't give that up while my partner/spouse is pregnant.	5	4	3	2	1
6. It's too hard for me to quit while my partner/spouse is pregnant.	5	4	3	2	1
7. I'm embarrassed to have to smoke.	5	4	3	2	1

8. My cigarette smoking bothers other people.	5	4	3	2	1
9. People think I'm foolish for ignoring the warnings about cigarette smoking.	5	4	3	2	1
10. My family told me to quit or cut down.	5	4	3	2	1
11. Smoking cigarettes is hazardous to my health.	5	4	3	2	1
12. I know of the increased risk of medical problems such as cancer.	5	4	3	2	1

Appendix E

Situational Temptation Inventory

INSTRUCTIONS

Listed below are situations that lead some people to smoke. We would like to know HOW TEMPTED you may be to smoke in each situation. Please answer the following questions using the following five point scale. Circle the number that matches your response for each statement.

5=Extremely tempted 4=Very tempted 3=Moderately tempted
2=Not very tempted 1=Not at all tempted

	Extremely tempted 5	Very tempted 4	Moderatel y tempted 3	Not very tempted 2	Not at all tempted 1
1. With friends at a party.	5	4	3	2	1
2. When I first get up in the morning.	5	4	3	2	1
3. When I am very anxious and stressed.	5	4	3	2	1
4. Over coffee while talking and relaxing.	5	4	3	2	1
5. When I feel I need a lift.	5	4	3	2	1
6. When I am very angry about something or someone.	5	4	3	2	1
7. With my spouse or close friend who is smoking.	5	4	3	2	1
8. When I realize I haven't smoked for a while.	5	4	3	2	1
9. When things are not going my way and I am frustrated.	5	4	3	2	1

Appendix F

Processes of Change Tool

INSTRUCTIONS

The following experiences can affect the smoking habits of some people. Think of any similar experiences you may be currently having or have had in the last month. Then rate the FREQUENCY of this event on the following five point scale by circling the appropriate number.

1=Never 2=Seldom 3=Occasionally 4=Often 5=Repeatedly

	Never	Seldom	Occasionally	Often	Repeatedly
1. When I am tempted to smoke I think about something else.	1	2	3	4	5
2. I tell myself I can quit if I want to.	1	2	3	4	5
3. I notice that nonsmokers are asserting their rights.	1	2	3	4	5
4. I recall information people have given me on the benefits of quitting smoking.	1	2	3	4	5
5. I can expect to be rewarded by others if I don't smoke.	1	2	3	4	5
6. I stop to think that smoking is polluting the environment.	1	2	3	4	5
7. Warnings about the health hazards of smoking move me emotionally.	1	2	3	4	5
8. I get upset when I think about my smoking.	1	2	3	4	5
9. I remove things from my home or place of work that remind me of smoking.	1	2	3	4	5
10. I have someone who listens when I need to talk about my smoking.	1	2	3	4	5
11. I think about information from articles and ads about how to stop smoking.	1	2	3	4	5

12. I consider the view that smoking can be harmful to the environment.	1	2	3	4	5
13. I tell myself that if I try hard enough I can keep from smoking.	1	2	3	4	5
14. I find society changing in ways that makes it easier for nonsmokers.	1	2	3	4	5
15. My need for cigarettes makes me feel disappointed in myself.	1	2	3	4	5
16. I have someone I can count on when I'm having problems with smoking.	1	2	3	4	5
17. I do something else instead of smoking when I need to relax.	1	2	3	4	5
18. I react emotionally to warnings about smoking cigarettes.	1	2	3	4	5
19. I keep things around my home or place of work that remind me not to smoke.	1	2	3	4	5
20. I am rewarded by others if I don't smoke.	1	2	3	4	5

What else would you like to tell me about your smoking behavior during your spouse/partner's pregnancy that has not been mentioned in these questions?

Thank you for completing this questionnaire. Please put the questionnaire in the self-addressed stamped envelope and return it to me in the mail within the next week. To thank you for your time in completing this questionnaire, I would like to send you a $5.00 certificate that can be used at any Target store. To get the $5.00 certificate, please print your name and address on the postcard that came with this questionnaire and put it in the mail. In order to ensure your anonymity, please do not include the postcard in the return envelope with the questionnaire. I will send out your certificate within the next 1-2 weeks.

Appendix G-1

UNIVERSITY OF MINNESOTA

Twin Cities Campus

Research Subjects' Protection Programs
Institutional Review Board: Human Subjects Committee (IRB)
Institutional Animal Care and Use Committee (IACUC)

Box 820
D528 Mayo Memorial Building
420 Delaware Street S.E.
Minneapolis, MN 55455-0392
612-626-5654
Fax: 612-626-6061
irb@umn.edu
iacuc@umn.edu
http://www.research.umn.edu/subjects.htm

August 10, 2000

Mary E. Tanner
[redacted]

Re: "Application of the Transtheoretical Model of Change to the Smoking Behaviors of Men Whose Partners are Pregnant"

Human Subjects Code Number: 0008M59882

Dear Ms. Tanner:

The referenced study was reviewed by expedited review and approved with one stipulation on August 7, 2000. This stipulation must be resolved and approved by the IRB before the study may be initiated.

- Please verify that questionnaires will not have identifiers attached to them, nor will the data be stored with identifiers.

We cannot record final approval for this study and the study may not be initiated until the stipulations have been satisfied. If your response is not received within 60 days, the study will be filed inactive.

If you have any questions or if we may assist you, please call [redacted].

Sincerely,
[redacted]
Karen A. Wenell
Assistant Director

CC: Mariah Snyder

Appendix G-2

UNIVERSITY OF MINNESOTA

Twin Cities Campus

Research Subjects' Protection Programs
Institutional Review Board: Human Subjects Committee (IRB)
Institutional Animal Care and Use Committee (IACUC)

Mayo Mail Code 820
D528 Mayo Memorial Building
420 Delaware Street S.E.
Minneapolis, MN 55455-0392
612-626-5654
Fax: 612-626-6061
irb@umn.edu
iacuc@umn.edu
http://www.research.umn.edu/subjects.htm

August 18, 2000

Mary E. Tanner
[redacted]

Re: "Application of the Transtheoretical Model of Change to the Smoking Behaviors of Men Whose Partners are Pregnant"

Human Subjects Code Number: **0008M59882**

Dear Dr. Tanner:

The IRB: Human Subjects Committee received your response to its stipulations. Since this information satisfies the requirements set by the IRB, final approval for the project is noted in our files. Upon receipt of this letter, you may begin your research.

For your records and for grant certification purposes, the approval date for the referenced project is August 09, 2000 and the Assurance of Compliance number is M1337. Approval will expire one year from that date. You will receive a report form two months before the expiration date. If you would like us to send certification of approval to a funding agency, please tell us the name and address of your contact person at the agency.

As Principal Investigator of this project, you are required by federal regulations to inform the IRB of any proposed changes in your research that will affect human subjects. Changes should not be initiated until written IRB approval is received. Adverse events should be reported to the IRB as they occur. Research projects are subject to continuing review and renewal.

The IRB wishes you success with this research. If you have questions, please call the IRB office at [redacted]

Sincerely,

[redacted]
Karen A. Wenell
Assistant Director

KAW/as
CC: Mariah Snyder

Appendix G-3

UNIVERSITY OF MINNESOTA

Twin Cities Campus

Research Subjects' Protection Programs
Institutional Review Board: Human Subjects Committee (IRB)
Institutional Animal Care and Use Committee (IACUC)

Mayo Mail Code 820
D528 Mayo Memorial Building
420 Delaware Street S.E.
Minneapolis, MN 55455-0392
612-626-5654
Fax: 612-626-6061
irb@umn.edu
iacuc@umn.edu
http://www.research.umn.edu/subjects.htm

November 27, 2000

Mary E. Tanner
[redacted]

Re: "Application of the Transtheoretical Model of Change to the Smoking Behaviors of Men Whose Partners are Pregnant"

Human Subjects Code Number: **0008M59882**

Dear Ms. Tanner:

The change in protocol for the referenced study described in your letter of November 5, 2000 was reviewed by expedited review and approved on November 22, 2000. The change under review involves increasing the number of study sites.

The reviewer notes that the increase in study sites does not include an increase in the number of subjects from your original application. Should you need to add more subjects you will need to submit a formal request to this office.

Thank you for keeping the IRB: Human Subjects Committee informed of the status of your research.

As Principal Investigator of this project, you are required by federal regulations to inform the IRB of any proposed changes in your research that will affect human subjects. Changes should not be initiated until written IRB approval is received. Adverse events should be reported to the IRB as they occur. Research projects are subject to continuing review and renewal.

If you have any questions or if we may assist you, please call [redacted]

On behalf of the IRB, I wish you continued success with your research.

[redacted]
Executive Assistant

MD/clm

CC: Mariah Snyder

Appendix G-4

UNIVERSITY OF MINNESOTA

Twin Cities Campus

Research Subjects' Protection Programs
Institutional Review Board: Human Subjects Committee (IRB)
Institutional Animal Care and Use Committee (IACUC)

Mayo Mail Code 820
D528 Mayo Memorial Building
420 Delaware Street S.E.
Minneapolis, MN 55455-0392
612-626-5654
Fax: 612-626-6061
irb@umn.edu
iacuc@umn.edu
http://www.research.umn.edu/subjects.htm

June 14, 2001

Mary E. Tanner
[redacted]

Re: "Application of the Transtheoretical Model of Change to the Smoking Behaviors of Men Whose Partners are Pregnant"

Human Subjects Code Number: **0008M59882**

Dear Dr. Tanner:

The IRB: Human Subjects Committee renewed its approval of the referenced project at its meeting on June 14, 2001. For grant certification purposes you will need this date and the Assurance of Compliance number, which is FWA0000312. Approval will expire one year from that date. You will receive a report form two months before the expiration date.

As Principal Investigator of this project, you are required by federal regulations to inform the IRB of any proposed changes in your research that will affect human subjects. Changes should not be initiated until written IRB approval is received. Adverse events should be reported to the IRB as they occur. Research projects are subject to continuing review.

If you have any questions, please call the IRB office at [redacted]

The IRB wishes you continuing success with your research.

Sincerely,

[redacted]
Assistant Director

CS/gc

CC: Mariah Snyder

Appendix H

SMDC

St. Mary's/Duluth Clinic
Health System

Duluth Clinic

400 East Third Street
Duluth, Minnesota 55805
(218) 722-8364

August 16, 2000

Mary E. Tanner, RN, MS, MSE
[redacted]

RE: Application of the Transtheoretical Model of Change to the Smoking Behavior of Men Whose Partners are Pregnant
SMDC IRB #08-00-05

Dear Ms. Tanner:

Thank you for submitting your project entitled "Application of the Transtheoretical Model of Change to the Smoking Behavior of Men Whose Partners are Pregnant" to the SMDC Institutional Review Board office for review. As Chair of the SMDC Institutional Review Board, I have administratively reviewed the application form, research plan, study participant letter, survey instruments and letters of support. It has been determined that your study qualifies for exempt status and does not need to be formally presented to the SMDC Institutional Review Board for full review. Therefore, your research study will be registered with the SMDC Institutional Review Board and Research Office. Please forward a copy of the University of Minnesota IRB approval letter upon receipt to the SMDC Research Office, Attention – Barbara Jablonski, IRB Secretary, SMDC Health System, 400 East Third Street, Duluth, Minnesota 55805.

Best wishes for a successful study. Please forward the results of your research study to the SMDC Institutional Review Board upon completion of the study so the file may be closed.

Sincerely,
[redacted]

Clyde R. Olson, MD
Chair, SMDC Institutional Review Board

CRO/bj

cc: Dr. Mariah Snyder, Professor
University of Minnesota, Minneapolis
School of Nursing

Appendix I

Whiteside Institute for Clinical Research
a collaboration of St. Luke's Foundation and UMD School of Medicine
915 East First Street • Duluth, MN 55805

Memorandum

To: Mary E. Tanner, RN, MS, MSE

CC: James Anderson, MD, St. Luke's Human Studies Research Committee

From: Whiteside Scientific Committee [redacted]
Marilyn Odean, Program Director

Date: September 20, 2000

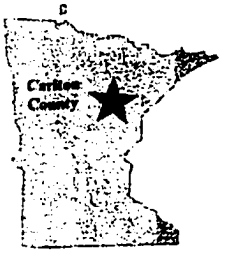
Re: Application of the Transtheoretical Model of Change to the Smoking Behavior of Men Whose Partners are Pregnant.

The Scientific Committee of the Whiteside Institute for Clinical Research (WICR) approved the above referenced research protocol to be carried out at St. Luke's Hospital at their meeting on Wednesday, September 6, 2000. You are reminded that this protocol must be submitted and approved by the St. Luke's Human Studies Research Committee before beginning enrollment, if this has not already been done.

The Whiteside Scientific Committee and St. Luke's Human Studies Research Committee each require that the Annual Human Studies Status Report be submitted upon study completion or at least annually. It will be sent to you approximately 10 months from the onset of the study and will be distributed to Committee members after its return.

We wish you success in your research project. If WICR can be of any assistance, please contact me at [redacted]

Appendix J-1



Carlton County Public Health

"Serving all the residents of Carlton County"

Julie Myhre, RN, MS
Supervisor

June 23, 2000

Mary Tanner, RN, MS, MSE
Assistant Professor
Department of Nursing
College of St. Scholastica
[redacted]

Dear Mary,

We are excited to hear about your doctoral research project that will focus on the smoking behavior of men whose partners are pregnant. This will be quite useful information for us to learn about as well. We are very interested in participating in this survey by helping you identify and survey the partners of prenatal clients we serve. I understand you are currently pursing approval for this survey through the University of Minnesota Human Subjects Committee. Please let us know when you have received approval. Thank you for giving this opportunity to work with you and learn some very valuable information.

[redacted]
Julie Myhre
Supervisor
Carlton County Public Health

30-10th Street North
Cloquet MN 55720

Phone: 1-218-879-4511
Toll free: 1-888-818-4511
Fax: 1-218-879-1925

Appendix J-2

[redacted]

DULUTH OB-GYN ASSOCIATES, P.A.

Obstetrics, Gynecology and Gynecologic Surgery

Northland Medical Center

Stefan Guttormsson, M.D.
James A. Sebastian, M.D.
Ann M. Rock, M.D.
Susan M. Goltz, M.D.
Elisabeth Revoir, M.D.
Judith L. Johnson, M.D.
Donna Claypool, RNP

9/14/00

Mary Tanner, RN, MS, MSE
Assistant Professor, Nursing
[redacted]

Dear Mary,

At our last corporate meeting the physicians reviewed your request to have our office participate in your study on smoking behavior of men whose partners are pregnant. All six physicians are willing to participate with your research study.

Please give our office a call to set up an appointment to discuss with our nurse practitioner, Donna Claypool, the distribution of the survey.

If you have any further questions or concerns, please give me a call at the office.

Sincerely yours,

[redacted]

Office Manager

1000 East First Street, Lower Level, Duluth, MN 55805 • Phone (218) 722-5629