

**An Exploration of the Process of Abstaining from Smoking and Preventing Relapse
to Smoking in the Context of Transitioning to Motherhood**

by

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Perinatal tobacco use impacts multiple individuals, the pregnant person, the fetus / newborn, and the newly developing family. Continued abstinence into the postpartum period is not a guarantee after successful cessation during pregnancy. Conservatively, the rate of postpartum relapse to smoking by the time the child reaches one-year-old is 50%. This dissertation explores tobacco decision-making in the context of transitioning to motherhood. The four stages of this transition begin in pregnancy (stage 1- preparing for maternal role) and continue into the first four months of the postpartum period (stage 2 – establishing maternal identity, stage 3 – moving toward a new normal, and stage 4 – achievement of maternal identity). Six postpartum women were interviewed for the study. Qualitative description was used to examine their experiences of abstaining from smoking during pregnancy and preventing relapse to smoking in the postpartum period. Discovered themes (40) were clustered into four categories – Motivations for Cessation and Abstinence, Processes for Cessation and Abstinence, Cycles of Abstinence and Relapse, and Considerations Regarding Use of Tobacco. Themes revealing tobacco decision-making were mapped to the stages of the transition to motherhood. Women who quit smoking for the sake of the fetus / newborn, and later recognized the benefits of cessation for self, were all successful in remaining abstinent from smoking in the postpartum period. Women who experienced any relapse in the postpartum period reported unique justifications for their perinatal smoking – personal

benefits of tobacco to relieve depression and misguided beliefs about their ability to shield the newborn from harmful tobacco smoke in the environment. Moving forward, misconceptions about perinatal smoking should be corrected to support decision-making and antecedents associated with relapse should be discussed during the childbearing cycle. The ability to remain abstinent may parallel progression through the stages of becoming a mother. Thus, the stages of the transition to motherhood may be a useful framework for understanding the challenges of maintaining smoking abstinence following childbirth.

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Preface

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1.0 Background

1.1 Introduction

In spite of mounting evidence that smoking is the greatest modifiable risk factor for morbidity and mortality (National Center for Chronic Disease Prevention and Health Promotion (US) & Office on Smoking and Health, 2014; Office of the Surgeon General (US) & Office on Smoking and Health (US), 2004; U.S. Department of Health and Human Services, 2020), one out of every nine women use tobacco (primarily smoking cigarettes) before, during, or after pregnancy (Cornelius, 2022). Because of concerns for the health of the fetus, smoking cessation rates during pregnancy rise (Colman & Joyce, 2003; Nighbor et al., 2020). However, the success of smoking cessation during pregnancy is not maintained in the postpartum period. By six months after the birth, approximately 30% to 50% of women will have resumed smoking (Rockhill, 2016). Data suggest that women's intentions to remain abstinent after the birth and their smoking behaviors postpartum are not well-aligned (Division of Reproductive Health, 2022).

Several predictors of postpartum smoking relapse have been identified and various interventions for preventing relapse have been developed, but long-term success at postpartum relapse prevention has been less than ideal. Relapse to smoking in the postpartum period affects the woman directly and her newborn and other family members indirectly.

The overall purpose of this dissertation was to gain a better understanding of the psychosocial process for abstaining from smoking and preventing relapse to smoking in the postpartum period in order to inform the development of new and effective relapse prevention strategies that meet the needs of women as they move through the stages of the transition to

motherhood. Proposed is a qualitative inquiry using grounded theory methodology to describe the dominant psychosocial process of abstaining from smoking and preventing relapse to smoking in the postpartum period according to the stages of the transition to motherhood, including identification of the facilitators and barriers to continued smoking abstinence and potential strategies to aide in smoking abstinence and relapse prevention.

1.2 Significance of the Problem of Perinatal Tobacco Use

1.2.1 Prevalence of Perinatal Tobacco Use

Epidemiological surveys are used to assess characteristics within a smaller group of participants and then generalize the results to a larger segment of the population. The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based telephone survey of US citizens at or above 18 years of age. Analysis of data for 2006, focusing on women between the ages of 18 and 44, revealed a median current smoking prevalence of 22.4% across the nation. The lowest rate was 5.8% in the US Virgin Islands and the highest rate was 34.7% in Kentucky (Centers for Disease Control and Prevention, 2008). Prevalence rates were higher among several subgroups: non-Hispanic whites (24.5%), divorced, widowed, or separated woman (34.7%) and women educated at a high school level or lower (57.7%) (Centers for Disease Control and Prevention, 2008).

Pregnancy, considered to be a crucial time for maternal health promotion, does not prevent some women from smoking. Data from a representative, population-based survey, concerning maternal behavior in the perinatal period, provides some estimates on smoking prevalence before,

during and after gestation. The federally developed Pregnancy Risk Assessment Monitoring System (PRAMS) surveys women reporting a live birth via the birth certificate registry of participating states. Recipients are sent a survey to be completed 2 to 6 months after the birth of a child (Centers for Disease Control and Prevention, 2009). Information from 16 of the 40 nationwide PRAMS sites, reporting a complete dataset from 2000-2005, was used for analysis. In 2000, 15.2% of women reported smoking during pregnancy; this rate decreased significantly to 13.8% in 2005. In 2000, 43.9% of women reported smoking cessation during pregnancy; this rate increased non-significantly to 45.7% in 2005 (Centers for Disease Control and Prevention, 2009). Using data from 26 PRAMS sites for 2005, the lowest smoking prevalence during pregnancy was 5.2% in New York City and the highest was 35.7% in West Virginia. From that same dataset, the highest smoking cessation prevalence was 61% in Hawaii and the lowest was 30.2% in West Virginia (Centers for Disease Control and Prevention, 2009).

1.2.2 Adverse Effects of Perinatal Tobacco Use

The adverse health effects of smoking were first addressed by the US Surgeon General in 1964. Since that time numerous updates have been published and all consistently identify tobacco use as the greatest modifiable risk factor for morbidity and mortality in the US population (National Center for Chronic Disease Prevention and Health Promotion (US) & Office on Smoking and Health, 2014; Office of the Surgeon General (US) & Office on Smoking and Health (US), 2004). A causal relationship between smoking and a multitude of adverse health states has been definitively established. Cancers such as oral, esophageal, stomach, pancreas, lung, kidney, bladder, cervical, and leukemia have been related to active smoking. Atherosclerosis, cerebrovascular disease, coronary heart disease, and chronic obstructive pulmonary disease have

also been related to smoking. Specifically for women, decreased fertility, pregnancy complications, increased risk of hip fracture, and lower bone density have been related to active smoking (National Center for Chronic Disease Prevention and Health Promotion (US) & Office on Smoking and Health, 2014; Office of the Surgeon General (US) & Office on Smoking and Health (US), 2004).

The adverse effects of smoking during the childbearing years have been studied extensively. Maternal smoking during pregnancy has been linked with 21% of all Sudden Infant Death Syndrome (SIDS) cases (Shah et al., 2006). During gestation, smoking has been causally related to various abnormal placental issues including previa and abruption (Castles et al., 1999; Hammoud et al., 2005; Hofhuis et al., 2003). Fetal effects of maternal smoking include intrauterine growth restriction, low birth weight, and smaller head circumference (Hammoud et al., 2005; Hofhuis et al., 2003; Salmasi et al., 2010). Several delivery complications have been linked with maternal smoking. Examples are preterm premature rupture of membranes, meconium-staining of amniotic fluid, preterm delivery, newborn respiratory distress syndrome, and neonatal intensive care unit admission (Ashford et al., 2010; Castles et al., 1999; Hammoud et al., 2005). Adverse long-term neurologic outcomes for offspring with a history of prenatal tobacco exposure have been identified during childhood and adolescence. These include attention or conduct disorders, antisocial behavior, and nicotine addiction (Blood-Siegfried & Rende, 2010; Cornelius & Day, 2009).

Exposure to cigarette smoke, independent of any maternal smoking behavior, has known negative consequences for newborns, including risk for SIDS (DiFranza et al., 2004; Hofhuis et al., 2003), periodontal disease and thrush (Arbes et al., 2001; Ladomenou et al., 2009), and

respiratory issues, such as infection, wheezing, asthma, nocturnal cough, and bronchitis (DiFranza et al., 2004; Hofhuis et al., 2003; Ladomenou et al., 2009; Pattenden et al., 2006).

There are many victims when cigarette smoking occurs in the home. A U.S. Surgeon General Report from 2006 addressed the health consequences of involuntary exposure to tobacco smoke (Office on Smoking and Health (US), 2006). Being in the presence of secondhand smoke immediately causes adverse effects and can lead to premature death in adults and children; thresholds for unacceptable levels of exposure to secondhand or thirdhand smoke have yet to be determined. Therefore 100% smoking bans are recommended to ensure a safe home environment (Office on Smoking and Health (US), 2006; U.S. Department of Health and Human Services, 2020).

1.2.3 Motivation for Perinatal Tobacco Abstinence

When exploring the phenomenon of smoking during the perinatal period, women provided multiple conflicting motivations and explanations for cessation activities. Some women felt they had no choice but to cease smoking during pregnancy. Their options were limited, whether by social influence or adverse physiologic reaction to tobacco during pregnancy (Bottorff et al., 2006). Following the birth, many women felt their choice regarding the use of tobacco products has been restored (Pletsch & Kratz, 2004). With many negative connotations and reactions concerning public tobacco use removed once the birth had occurred, women admitted to finding themselves in many situations involving temptation and social influence to smoke (Edwards & Sims-Jones, 1998; Nguyen et al., 2011). Some of the responses postpartum women provided when considering their option to resume smoking provide evidence of mistaken reasoning. Some women felt that tobacco use would positively impact their attempts to lose weight (Nichter et al.,

2008). Others felt that the environment around the child can be controlled to the point that harm from tobacco exposure will not occur (Von Kohorn et al., 2012). Based on these comments from postpartum women, maintaining smoking abstinence purely for the health of the fetus (newborn) may diminish in importance once the birth has occurred. Exploring perinatal cessation activities for the sake of the woman's health may be a key component in the promotion of long-term relapse prevention in the postpartum period.

1.2.4 Postpartum Relapse to Smoking

The mounting and unequivocal evidence for the adverse health effects of tobacco use and exposure to cigarette smoke during the perinatal period has had little impact on maternal tobacco use in society today. Returning to the PRAMS dataset from 16 sites reporting for 2005, between 2 and 6 months postpartum, the smoking relapse rate was 51.4%. The highest prevalence of smoking relapse was in Arkansas (62%) while Oregon had the lowest smoking relapse rate at 36.4% (Centers for Disease Control and Prevention, 2009). Studies have identified the sociodemographic characteristics of women who are most susceptible to postpartum smoking relapse including: unintended pregnancy, delayed prenatal care until the second trimester, black, less than 25 years old, without a high school diploma, unmarried, on Medicaid, using Women, Infant and Children (WIC) services, and an annual household income of less than \$15,000 (Centers for Disease Control and Prevention, 2009). Based on the complexity of the problem of postpartum relapse to smoking, potential risk factors are unlikely to be limited to sociodemographic characteristics. A literature search was undertaken to explore the current research regarding potential predictors of relapse to smoking following the birth of a child.

1.3 Predictors of Postpartum Relapse to Smoking

An integrated review (unpublished) was conducted during the PhD program to identify current literature on predictors for sustaining abstinence or risk factors for postpartum relapse to smoking (Bare, 2013, November 11). Integrated reviews are useful when review of experimental and non-experimental studies is undertaken with an explicit and defined systematic approach (Whittemore & Knafl, 2005). Quantitative, qualitative, and mixed methods studies were reviewed for the purpose of defining predictors of postpartum decision-making regarding tobacco use.

1.3.1 Search Strategy

Four electronic literature databases (CINAHL, Cochrane Library, Ovid PsycINFO, and PubMed) were searched in December 2012. The focus of the search within each database was trifold: postpartum period, smoking, and relapse prevention. Search terms were individualized for the specific databases used and included postpartum smoking relapse prevention; pregnancy and postpartum, postnatal period, postpartum period; tobacco smoking, smoking cessation; and recurrence, relapse prevention, smoking relapse prevention, recurrence/prevention, and control. Search limits included English language and abstract availability.

1.3.2 Study Inclusion and Exclusion Criteria

To be included in the review studies had to be conducted in the United States, published in 2003 or later, and describe predictors for sustaining abstinence or risk factors for postpartum smoking relapse. The cumulative results of the search were 342 articles (Figure 1). After 196

duplicates were removed, the remaining abstracts (146) were reviewed based on the inclusion criteria. Major reasons for abstract exclusion (87) were international studies, research published more than 10 years ago, or failure to examine risk factors or predictors of postpartum smoking relapse. The remaining full-text articles (59) were reviewed based on the inclusion criteria. Major reasons for article exclusion (31) were international studies and failure to examine risk factors or predictors of postpartum smoking relapse. Thus, 27 articles were included in the review.

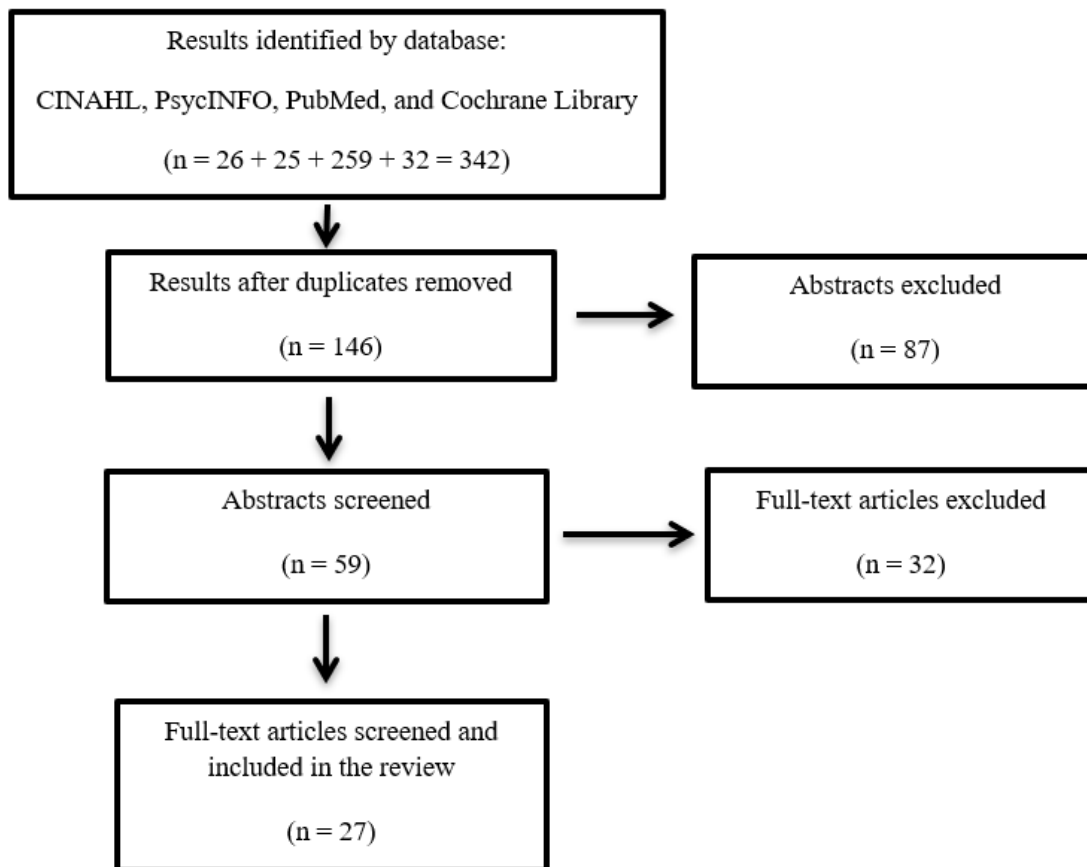


Figure 1 Process for Selection of Papers for Review of Literature on Risk Factors or Predictors of Postpartum Smoking Relapse

1.3.3 Extraction of Data for Review

The review focused on aspects of a woman's life during the postpartum period that could be described as predictors of sustaining abstinence or relapse to smoking. Methodological concerns about the studies included the variation in rigor of study designs, diversity of measures for smoking status, and lack of consistency in follow-up periods. Data summarized from the articles includes study design and purpose; population, sample, and retention rates (if appropriate); method; outcomes and measures; and results. Data are presented in Table 1 (qualitative studies), Table 2 (mixed methods studies), and Table 3 (quantitative studies).

1.3.4 Results

The results of this integrated review are organized according to study design (including summary tables), sampling and duration of follow-up, measures of smoking status, and predictors of postpartum smoking outcomes.

1.3.5 Study Designs

1.3.5.1 Qualitative Studies

Seven qualitative studies were reviewed and several approaches were used including: qualitative description (Gaffney et al., 2008; Pletsch & Kratz, 2004); grounded theory (Kennison, 2009; Nguyen et al., 2011; Ripley-Moffitt et al., 2008; Von Kohorn et al., 2012) and ethnography (Nichter et al., 2008) . See Table 1 for a summary of studies that used qualitative methods.

Table 1 Quantitative Studies (N=7)

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
(Gaffney et al., 2008) Qualitative descriptive study Describe perceived infant irritability and postpartum tobacco use	Nutrition programs for low-income women in southern region of US N = 86 71% 20-30 years old 56% white 44% 12 years of school 51% multiparous	Semi-structured interview within first 3 months postpartum	Smoking status by expired CO level	51% relapse rate by 2 weeks postpartum Four themes linked infant irritability and relapse – not knowing what to do, seeking renewal, seeking relief, and evaluating self.
(Kennison, 2009) Grounded Theory study Develop theoretic foundation for promotion of lifelong abstinence	County health departments in northeastern Florida N = 15 (plus 2 older women for historical perspective) Age range 19-38 53% white 50% HS or less education	Semi-structured interviews in the third trimester and up to 3 months postpartum		Seven themes identified – importance of smoking (craving or fix for boredom/tension), imposed restrictions during pregnancy, reconciling by stopping, reconciling by concealing, reconciling in postpartum, smoking bans in postpartum, choosing new priorities
(Nguyen et al., 2011) Grounded Theory study Describe influences on relapse and role of social networks	University-based hospital in urban setting N = 24 Age range 18-36 63% white 54% some college	Semi-structured interview (using Theory of Planned Behavior) during postpartum hospitalization		Three themes related to changes in relationships after cessation – being part of social network with smoking norms, being tempted to smoke by others in social network, changing relationships with others in social network after cessation
(Von Kohorn et al., 2012) Grounded Theory study Describe postpartum plan related to smoking	Inner-city teaching hospital in Boston N = 24 Age range 18-36 63% white 87% minimum of HS education 54% primiparous	Semi-structured interview (using Theory of Planned Behavior) during postpartum hospitalization	Self-reported future intentions regarding tobacco use in postpartum period	79% intend abstinence 13% intend to smoke 8% unsure Three themes identified – concern about ability to fulfill intention, belief in ability to protect newborn from exposure to smoke, belief in self-control to maintain postpartum abstinence

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
(Nichter et al., 2008) Longitudinal ethnographic study Describe trajectories of smoking	Low-income women in southwestern region of US N = 44 Age range 18-43 62% Anglo American 39% HS diploma 64% multiparous	Semi-structured interviews at 1, 3 and 6 months postpartum	Smoking status by salivary cotinine analysis	23% abstinence 48% decreased 50% from pre-pregnant level 16% decreased 33% from pre-pregnant level Abstainers had strong social support and worried if children saw smoking behavior. Relapsers used smoking to cope with stress and resumed daily interactions. During postpartum there were fewer messages to quit, less support, return to smoking environment and use of smoking for socialization.
(Pletsch & Kratz, 2004) Longitudinal qualitative descriptive study Describe reasons for postpartum smoking relapse	Prenatal clinics at urban academic medical center in Midwestern region of US N = 15 Age 24 +/- 5.7 years 53% African American Education 12 +/- 1.8 years 60% multiparous	Semi-structured interviews early in pregnancy, at 36 weeks gestation and 3 months postpartum	Smoking status by self-report	73% relapse Aversion to taste and smell of smoke related to state of pregnancy with reversal in postpartum.
(Ripley-Moffitt et al., 2008) Grounded Theory study Describe the factors in abstinence vs. relapse	Community-based clinics in central North Carolina N = 94 Age mean 25 years 58% white Education mean 12.9 years 64% primiparous	Structured telephone calls at 1 week and 3 months postpartum, then structured interview at 4 months postpartum	Smoking status by urinary cotinine analysis at interview	54% relapse Five themes for abstinence – belief in health benefits for self and child, internal belief in abstinence, social support, negative results with exposure to cigarettes, solid strategies for dealing with temptation. Six themes for relapse – access to cigarettes, lack of support, difficulties with new motherhood, physical addiction, smoking for stress relief, low self-esteem, or depression.

1.3.5.2 Mixed-Methods

Mixed methods studies, including quantitative survey techniques and observation and content analysis of qualitative interviews, were used in three articles (Park, Chang, Quinn, Regan, et al., 2009; Park, Chang, Quinn, Ross, et al., 2009; Psaros et al., 2012) See Table 2 for a summary of studies that used qualitative methods.

Table 2 Mixed Methods Studies (N=3)

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
(Park, Chang, Quinn, Ross, et al., 2009) Mixed methods – prospective repeated measures observational study & content analysis Assess association between perceived changes in support and smoking relapse in the postpartum	Academic center in northeastern US N = 65 Age 28.8 +/- 6.1 years 52% white 54% HS / some college 68% nulliparous Retention rates: 80% at 2 weeks 75% at 24 weeks	Enrollment at delivery then telephone survey at 2, 6, 12 and 24 weeks postpartum Semi-structured interview if relapse	Smoking status by self-report Perceived support categories – emotional, informational, instrumental, smoking-specific	Relapse rates: 10% at 2 weeks 25% at 6 weeks 37% at 12 weeks 47% at 24 weeks Emotional support at baseline related to smoking status at 24 weeks (p=0.02). Change in smoking-specific support over time related to smoking status at 24 weeks (p<0.001). Relapsers (25/65) said no one supported them (50%) or if they received support, it was negative or unhelpful.
(Park, Chang, Quinn, Regan, et al., 2009) Mixed methods – prospective repeated measures observational study & content analysis Assess association between worsening depressive symptoms, anxiety and stress and smoking relapse in the postpartum	Academic center in northeastern US N = 65 Age 28.8 +/- 6.1 years 52% white 54% HS / some college 68% nulliparous Retention rates: 80% at 2 weeks 75% at 24 weeks	Enrollment at delivery then telephone survey at 2, 6, 12 and 24 weeks postpartum Semi-structured interview if relapse	Smoking status by self-report Beck Depression Inventory (BDI) Beck Anxiety Inventory (BAI) Perceived Stress Scale (PSS)	Relapse rates: 10% at 2 weeks 25% at 6 weeks 37% at 12 weeks 47% at 24 weeks Counseling for depression/anxiety during pregnancy related to smoking status at 24 weeks (p=0.02). Increase in BDI related to relapse at 24 weeks (p=0.01). Increase in BDI, BAI and PSS total related to relapse at 24 weeks (p=0.03). Relapsers (25/65) had environmental and physiological triggers, and negative emotions (stress, frustrations, struggles with childcare, issues with return to work).

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
(Psaros et al., 2012) Mixed methods – prospective repeated measures observational study & content analysis Assess symptoms of depression, anxiety, and stress in relation to smoking relapse in the postpartum	Academic center in northeastern US N = 65 Age 28.8 +/- 6.1 years 52% white 54% HS / some college 68% nulliparous	Enrollment at delivery then telephone survey at 2, 6, 12 and 24 weeks postpartum Semi-structured interview if relapse or BDI &/or BAI score > 9	Smoking status by self-report Beck Depression Inventory (BDI) Beck Anxiety Inventory (BAI)	26 interviewed Affective states included anger, stress and frustration but unknown source of these symptoms. Smoking used to cope with negative affect – improves mood and part of avoidant coping.

1.3.5.3 Quantitative Studies

Seventeen articles used a quantitative approach. See Table 3 for a summary of studies that used quantitative methods, including two population surveys (Allen et al., 2009; Gyllstrom et al., 2012), a correlational approach (Gaffney & Henry, 2007) and an exploratory pilot study (Letourneau et al., 2007). Four studies used a descriptive approach (Levine et al., 2010; Levine et al., 2006; Levine et al., 2008; Simonelli & Velicer, 2012). The remaining articles were secondary analyses of data from randomized clinical trials of interventions for relapse prevention; including six related to a motivation and problem-solving intervention (Businelle et al., 2013; Correa-Fernandez et al., 2012; Heppner et al., 2011; Kendzor et al., 2010; Reitzel et al., 2011; Reitzel et al., 2007), two related to vouchers as an intervention for relapse prevention (Higgins et al., 2009; Solomon et al., 2007) and one related to stages of change as an intervention for relapse prevention (Ma et al., 2005).

Table 3 Quantitative Studies (N=17)

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
(Allen et al., 2009) Cross-sectional population survey Evaluate relationship between postpartum depressive symptoms and postpartum smoking relapse	16 states in Pregnancy Risk Assessment Monitoring System (PRAMS) N = 2566 65% 20-29 years old 71% white 60% 12 years or less of education 55% nulliparous	Stratified, systematic random sampling from birth certificates Self-administered questionnaire mailed 2-3 months postpartum Telephone interview as needed	Smoking status by self-report 2 question tool for depression symptoms	Relapse rates: 23.4% relapse if depressive symptoms versus 14.1% abstinence if depressive symptoms (p<0.001). Unadjusted model for relapse: OR=1.86 if depressive symptoms. Adjusted model for relapse: OR=1.77 if depressive symptoms.
(Gyllstrom et al., 2012) Cross-sectional population survey Examine mental health factors in relation to smoking cessation and postpartum relapse	Minnesota PRAMS N = 1416 47% 25-34 years old 58% 12 years or less of education 52% multiparous	Random sampling from birth certificates Self-administered questionnaire mailed 2-4 months postpartum Telephone interview as needed	Smoking status by self-report Modified Life Events Inventory Maternal mood dichotomized 2 question tool for depression symptoms	Relapse rates: 65% if depressive symptoms versus 46% if no depressive symptoms (p=0.009). Mood, stress and depressive symptoms were not associated with postpartum relapse.
(Businelle et al., 2013) Secondary analysis of randomized clinical trial Evaluate 4 conceptual models of pathway linking SES and postpartum smoking relapse	Healthcare system around Houston N = 251 Age 24.6 +/- 5.3 years 36% white 32% African American 30% Latino Education 12.9 +/- 2.0 years Retention rates: 79.7% at 8 weeks	Enrollment at 30-33 weeks gestation then follow-up at 8 and 26 weeks postpartum Tx: Motivation and Problem-Solving counseling including phone calls and face-to-face sessions	Smoking status by exhaled CO level or salivary cotinine level Demographic information Tobacco use information Positive and Negative Affect Scale Center for Epidemiologic Studies Depression Scale Self-efficacy / Confidence Scale	Relapse rates: 64.5% at 8 weeks 80.1% at 26 weeks Best fitting model: craving as sole final step between SES and relapse. SES directly and indirectly increased risk of postpartum relapse. SES impacts Negative Affect / Stress and Agency which both impact Craving which leads to relapse.

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
	78.5% at 26 weeks		Affective Information Processing Questionnaire Craving subscale of Wisconsin Smoking Withdrawal Scale	
(Correa-Fernandez et al., 2012) Secondary analysis of randomized clinical trial Examine relationship between depression or anxiety on postpartum smoking relapse	Healthcare system around Houston N = 251 Age 24.6 +/- 5.3 years 36% white 32 % African American 30% Latino 60% 12 years or more of education Attrition rates: 20.7% at 8 weeks 25.9% at 26 weeks	Enrollment at 30-33 weeks gestation then follow-up at 8 and 26 weeks postpartum Tx: Motivation and Problem-Solving counseling including phone calls and face-to-face sessions	Smoking status by exhaled CO level or salivary cotinine level Demographic information Patient Health Questionnaire Positive and Negative Affect Scale Perceived Stress Scale Self-efficacy / Confidence Scale Affective Information Processing Questionnaire Wisconsin Inventory of Smoking Dependence Motives Interpersonal Support Evaluation List Perceived partner support	Relapse rates: 79% at 8 weeks if major depressive or anxiety syndrome 93% at 26 weeks if major depressive or anxiety syndrome More likely to relapse if major depressive syndrome (OR=2.29). More likely to relapse if anxiety syndrome (OR=3.03). Adjusting for major depressive syndrome: anxiety syndrome predicted relapse (p=0.03). Self-efficacy in negative / affective situations mediated effects of major depressive or anxiety syndrome on relapse (p<0.001, p<0.05).
(Heppner et al., 2011) Secondary analysis of randomized clinical trial Examine predictive utility measures of motivation for postpartum	Healthcare system around Houston N = 251 Age 24.6 +/- 5.3 years 36% white 32 % African American 30% Latino	Enrollment at 30-33 weeks gestation then follow-up at 8 and 26 weeks postpartum Tx: Motivation and Problem-Solving counseling including phone	Smoking status by exhaled CO level or salivary cotinine level Demographic information Tobacco use information Abstinence goal Stages of Change Reasons for quitting Global motivation – Texas Smoking	Each motivation measure significantly predicted abstinence. Full cohort with intention-to-treat (ITT) model: global motivation (p=0.006) and parenthood motives (p=0.043) predicted abstinence. Full cohort with completers model: global motivation

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
smoking outcomes	48% 12 years or less of education Retention rates: 80% at 8 weeks 78% at 26 weeks	calls and face-to-face sessions	Abstinence Motivation Scale	(p=0.003) predicted abstinence. Reduced model using ITT and completers: global motivation (p=0.0007, P=0.0003) and parenthood motives (p=0.014, p=0.032) predicted abstinence.
(Kendzor et al., 2010) Secondary analysis of randomized clinical trial Examine the relationship between breastfeeding and postpartum smoking abstinence	Healthcare system around Houston N = 251 Age 24.6 +/- 5.3 years 36% white 32 % African American 30% Latino 48% 12 years or less of education Retention rates: 80% at 8 weeks 78% at 26 weeks	Enrollment at 30-33 weeks gestation then follow-up at 8 and 26 weeks postpartum Tx: Motivation and Problem-Solving counseling including phone calls and face-to-face sessions	Smoking status by exhaled CO level or salivary cotinine level Demographic Information Questionnaire Tobacco History Questionnaire Breastfeeding intentions and current status	Relapse rate: 20% (N=199) relapsed and still breastfeeding 40.2% (N=199) any breastfeeding at 8 weeks Adjusted model: breastfeeding at 8 weeks associated with higher rates of abstinence at 8 weeks (OR=7.27, p<0.001, N=182). Adjusted model: breastfeeding at 8 weeks associated with higher rates of abstinence at 26 weeks (OR=2.64, p=0.02, N=182).
(Reitzel et al., 2007) Secondary analysis of randomized clinical trial Examine relationship between subjective social status and postpartum smoking outcomes in women 18-24	Healthcare system around Houston N = 123 Age 22.0 +/- 1.24 years 38% white 31% black 28% Hispanic 79% 12 years or more of education	Enrollment at 30-33 weeks gestation then follow-up at 8 and 26 weeks postpartum Tx: Motivation and Problem-Solving counseling including phone calls and face-to-face sessions	Smoking status by exhaled CO level or salivary cotinine level Demographic information MacArthur Scale of Subjective Social Status – SES ladder version Likelihood of postpartum smoking Positive and Negative Affect Scale Perceived Stress Scale Self-efficacy / Confidence Scale	Adjusted model: subjective status predictive of likelihood of smoking (p=0.005), confidence (p=0.02), temptations (p<0.001) and tobacco dependence (p<0.001). Adjusted model: subjective social status associated with more depression (p=0.59), greater stress (p=0.072), lower positive affect (p=0.001), higher negative affect (p=0.039), and lower perceived social support (p=0.001).

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
			Temptation Inventory Center for Epidemiologic Studies Depression Scale Wisconsin Inventory of Smoking Dependence Motives Interpersonal Support Evaluation List	
(Reitzel et al., 2011) Secondary analysis of randomized clinical trial Examine the relationship of history of menthol cigarette use on postpartum smoking outcomes	Healthcare system around Houston N = 244 Age 24.6 +/- 5.3 years 36% white 33% African American 31% Latino 82% 12 years or more of education Attrition rates: 21% at 8 weeks 28% at 26 weeks	Enrollment at 30-33 weeks gestation then follow-up at 8 and 26 weeks postpartum Tx: Motivation and Problem-Solving counseling including phone calls and face-to-face sessions	Smoking status by exhaled CO level or salivary cotinine level Demographic information Smoking history information	Adjusted model: history of menthol cigarette use not predictive of continuous abstinence at 26 weeks (p=0.29). Interaction of history of menthol use and race/ethnicity significant (p=0.02). History of menthol predictive of postpartum smoking outcomes for white women (p=0.02); less likely to maintain abstinence with menthol history (OR=0.19). History of menthol non-significantly predictive of postpartum smoking outcomes for African American women (p=0.08) or Latino women (p=0.35)
(Gaffney & Henry, 2007) Descriptive, correlational study Identify factors associated with motherhood contributing to postpartum	WIC offices in northern Virginia N = 133 Age 23.2 +/- 4.8 years 59% white Education 11.64 +/- 1.7 years 50 primiparous	Enrollment before 12 weeks postpartum	Smoking status by exhaled CO levels Demographic information Smoking history information Revised Fagerstrom Tolerance Questionnaire Fussiness Rating Scale	Relapse rates: 58.6% by 7 days postpartum 68.7% by 14 days postpartum Self-efficacy to refrain from smoking and relapse at 2 weeks postpartum (r = -0.555, p<0.001). Pre-pregnancy dependence, number of contacts who

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
smoking outcomes			What Being the Parent of a Baby is Like Smoking Abstinence Self-Efficacy Scale	smoke, prenatal intentions regarding postpartum smoking and confidence to avoid smoking if baby cries related to self-efficacy to refrain from smoking and actual outcomes at 2 weeks postpartum
(Higgins et al., 2009) Secondary analysis of randomized clinical trial Examine how education relates to achieving longer-term smoking abstinence	Obstetric and WIC offices in greater Burlington area N = 316 Age 23.5 +/- 5.3 years 95% Caucasian 69% 12 years or less of education 55% primiparous	Enrollment before 26 weeks gestation then follow-up at 28-32 weeks gestation and 2, 4, 8, 12, and 24 weeks postpartum Tx: abstinence-contingent vouchers Relapse prevention studies (n=11) Smoking cessation studies (n=206)	Smoking status by urinary cotinine levels Demographic information Smoking characteristics Psychiatric symptoms	Abstinence at 24 weeks postpartum for entire cohort: OR=4.2 if 12 years of education, OR=2.8 of greater than 12 years of education (p=0.02). Abstinence at 24 weeks postpartum if smoker start of prenatal care: OR=4.2 if 12 years of education, OR=11.9 if greater than 12 years of education (p=0.02). Spontaneous quitters receiving relapse prevention treatment: education level not predictive.
(Solomon et al., 2007) Secondary analysis of randomized clinical trial Examine factors of postpartum relapse in women abstinent at end of pregnancy	Obstetric and WIC offices in greater Burlington area N = 87 Average age 25.4 98% Caucasian Average years of education 13.3 66% primiparous	Enrollment before 26 weeks gestation then follow-up at 28-32 weeks gestation and 2, 4, 8, 12, and 24 weeks postpartum Tx: abstinence-contingent vouchers Relapse prevention studies (n=11) Smoking cessation studies (n=206)	Smoking status by urinary cotinine levels Demographic information Smoking characteristics Postpartum smoking intentions Brief Symptom Inventory Global Score Beck Depression Inventory (BDI) Stress rating Weight concerns	Relapse rate: 48% at 6 months 31% in first 30 days 39% in first 30-90 days 30% in first 90-180 days 67% high energy / negative emotion at first cigarette Relapse factors: younger (p=0.04), unmarried (p=0.05), more contact with smokers (p=0.004), higher BDI score (p=0.02), higher stress rating (p=0.02). Adjusted model for relapse factors: higher BDI score (OR=1.21, p=0.004), greater weight concerns (OR=0.76, p=0.008).

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
(Letourneau et al., 2007) Exploratory pilot study Examine the timing and predictors of smoking relapse in the postpartum	Academic hospital in New Haven N = 49 80% older than 19 41% Hispanic 39% less than HS Retention rate: 76% at 2 weeks	Enrollment at delivery then follow-up at newborn's 2-week appointment	Smoking status by urinary cotinine levels Demographic information Pregnancy and delivery information Edinburgh Postpartum Depression Scale	Relapse rate: 40.5% at 2 weeks Factors associated with relapse: race (p<0.02), HS education or less (p<0.04), smoking in the home (p<0.003), formula feeding (p<0.005) Relapsers said being around smoking (40%) and stress (53%) played a role in relapse.
(Levine et al., 2006) Cross-sectional, descriptive study Evaluate motivation to remain abstinent postpartum and examine shape, weight, and mood concerns with motivation to remain abstinent	Urban hospital in Pittsburgh N = 119 Age 24.3 +/- 5.9 years 54% white	Enrollment in third trimester	Demographics and pregnancy-related information Smoking behavior information Fagerstrom Test of Nicotine Dependence Motivation & confidence to remain abstinent Three-Factor Eating Questionnaire Cessation-specific weight concerns Self-efficacy for weight management after quitting Use of smoking for weight control Center for Epidemiological Studies Depression Scale Perceived Stress Scale	65% highly motivated to remain abstinent 74% confident in ability to maintain abstinence Highly motivated had more stress (p=0.05), higher weight self-efficacy (p=0.0003), less smoking for weight control (p=0.05). Unadjusted and adjusted models: self-efficacy for weight management associated with motivation to maintain abstinence (p=0.004, p=0.004).
(Levine et al., 2008) Cross-sectional, descriptive study Examine black and white women on	Urban hospital in Pittsburgh N = 174 Age 24.4 +/- 5.1 years for white women	Enrollment in third trimester	Demographics and pregnancy-related information Smoking behavior information Fagerstrom Test of Nicotine Dependence	No difference between black and white women on depressive symptoms and perceived stress. Adjusted model: no significant differences in mood, smoking-related

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
factors conceptually related to postpartum smoking relapse	Age 23.9 +/- 6/1 years for black women 61% white		Motivation & confidence to remain abstinent Three-Factor Eating Questionnaire Cessation-specific weight concerns Self-efficacy for weight management after quitting Use of smoking for weight control Center for Epidemiological Studies Depression Scale Perceived Stress Scale Positive and Negative Affect Scales	weight concerns or general weight concerns.
(Levine et al., 2010) Prospective, longitudinal, descriptive study Examine effect of mood, weight concerns, situational factors and demographics on postpartum smoking relapse	Urban hospital in Pittsburgh N = 183 Age 24.2 +/- 5.4 years 62% white 82% HS or more Retention rates: 83% at 6 weeks 76% at 12 weeks 81% at 24 weeks	Enrollment in third trimester then follow-up at 6, 12 and 24 weeks postpartum	Smoking status by expired CO levels Demographics and pregnancy-related information Smoking behavior information Fagerstrom Test of Nicotine Dependence Motivation & confidence to remain abstinent Three-Factor Eating Questionnaire Cessation-specific weight concerns Self-efficacy for weight management after quitting Use of smoking for weight control Center for Epidemiological	Abstinence rates: 53% at 6 weeks 38% at 12 weeks 35% at 24 weeks Unadjusted model: smoking specific weight concerns predictive of relapse (p=0.007) while weight self-efficacy and positive affect protective against relapse (p=0.048, p=0.029). Adjusted model: smoking specific weight concerns predictive of relapse (p=0.02).

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
			Studies Depression Scale Perceived Stress Scale Positive and Negative Affect Scales	
(Ma et al., 2005) Secondary analysis of randomized clinical trial Compare factors involved in cessation during pregnancy and continued abstinence in postpartum	6 community health centers in Boston N = 327 Average age 26.2 years 57% white 41% nulliparous Retention rates: 81% (137/169) those at delivery who quit with pregnancy 62% (109/176) those at 6 months who were non-smoking at delivery	Enrollment early in pregnancy then follow-up end of pregnancy, 1, 3 and 6 months postpartum Tx: healthcare provider and office personnel training to deliver comprehensive smoking intervention adjusting for woman's stage of change; 3 avenues of counseling – obstetrician, pediatrician, WIC counselor	Smoking status by self-report Demographic information Fagerstrom Test of Nicotine Dependence Smoking behavior information Environmental factors	Relapse rates: 76% at 6 months for baseline smokers 58% at 6 months for spontaneous quitters Factors associated with continued abstinence: older age (p=0.04), spontaneous quitting (p=0.03) and fewer household smokers (p=0.02). Factors not associated with continued abstinence: race/ethnicity, marital status, education, parity, age started smoking, level of addiction, mood, level of emotional or social support.
(Simonelli & Velicer, 2012) Prospective, longitudinal, descriptive study Examine stage of change, decisional balance and temptation to smoke in the postpartum period	2 teaching hospitals in northeast US N = 121 Age 27.9 +/- 5.9 years 65% white 55% HS or more Retention rate: 93% at 2 months	Enrollment at delivery then follow-up at 2 months postpartum	Smoking status by self-report Socio-demographic information Staging algorithm for acquisition phase Perceived partner support for not smoking Decisional Balance Inventory Situational Temptations Inventory	Ambivalent = 30% (flat pros, cons and temptations average) High Risk = 21% (high temptations and pros, average cons) Most Protected = 30% (low temptations and pros, cons average) Risk Denial = 20% (average temptations, high pros, low cons) Cluster membership significantly predictive of relapse at 2 months. Ambivalent (OR=2.6)

Authors and Year, Study Design and Purpose	Population and Retention Rates	Methods	Outcomes and Measures	Results
				Risk Denial (OR=3.5) High Risk (OR=4.3)

1.3.6 Sampling and Duration of Follow-up

A cross-sectional sampling design was used in three qualitative studies (Gaffney et al., 2008; Gaffney & Henry, 2007; Nguyen et al., 2011; Von Kohorn et al., 2012) and four quantitative studies (Allen et al., 2009; Gyllstrom et al., 2012; Levine et al., 2006; Levine et al., 2008). The remaining 20 studies used a longitudinal design. The shortest follow-up interval was two weeks (Letourneau et al., 2007). The majority of the longitudinal studies had follow-up time points between 24 and 26 weeks postpartum (Businelle et al., 2013; Correa-Fernandez et al., 2012; Heppner et al., 2011; Higgins et al., 2009; Kendzor et al., 2010; Kennison, 2009; Letourneau et al., 2007; Levine et al., 2010; Ma et al., 2005; Nichter et al., 2008; Park, Chang, Quinn, Regan, et al., 2009; Park, Chang, Quinn, Ross, et al., 2009; Pletsch & Kratz, 2004; Psaros et al., 2012; Reitzel et al., 2011; Reitzel et al., 2007; Ripley-Moffitt et al., 2008; Simonelli & Velicer, 2012; Solomon et al., 2007).

1.3.7 Measures of Smoking Status

For the 14 studies that assessed smoking status, the majority used some form of bioverification. Expired carbon monoxide (CO) levels were used in three studies (Gaffney et al., 2008; Gaffney & Henry, 2007; Levine et al., 2010). One study used salivary cotinine levels

(Nichter et al., 2008) and four studies used urinary cotinine levels (Higgins et al., 2009; Letourneau et al., 2007; Ripley-Moffitt et al., 2008; Solomon et al., 2007). The secondary analysis studies, using data from the clinical trial studying motivation and problem-solving counseling, reported either expired CO levels or salivary cotinine levels (Businelle et al., 2013; Correa-Fernandez et al., 2012; Heppner et al., 2011; Kendzor et al., 2010; Reitzel et al., 2011; Reitzel et al., 2007). A study designed to look at bioverification versus self-report for accuracy of smoking status examined 131 women during pregnancy and in the postpartum. Agreement between self-report and urinary cotinine levels reached $\geq 95\%$ (Higgins et al., 2007).

1.3.8 Predictors of Postpartum Smoking Outcomes

During pregnancy women often develop an aversion to the taste or smell of cigarette smoke, an advantage for successful smoking cessation. Prenatal hormonal changes are a likely causative factor. During interviews with 15 postpartum women, a reversal of this aversion to cigarettes following delivery was described (Pletsch & Kratz, 2004). In a review of 316 women, the number of years of education achieved was related to abstinence or relapse in the postpartum; education less than 12 years was related to relapse while greater than 12 years was related to continued abstinence (Higgins et al., 2009). Among young women (age 18-24), their subjective view of current social status was shown to be predictive of affect rating, stress level, and smoking status in the postpartum period (Reitzel et al., 2007). The strength of the association between breastfeeding choice and abstinence was described in a sample of 199 women (Kendzor et al., 2010). Women who were still nursing at 8 weeks postpartum were over 7 times more likely (OR=7.27) to be abstinent at that time and over 2 times more likely (OR=2.64) to be abstinent at 26 weeks postpartum (Kendzor et al., 2010). One study explored the role a history of menthol

cigarette use had on postpartum relapse risk (Reitzel et al., 2011). The presence of a significant interaction effect between history of menthol use, and race or ethnicity was determined. For women with a history of menthol cigarette use, relapse risk was significantly increased for white women compared to African American and Latina women.

1.3.8.1 Infant Issues as Predictors of Relapse or Abstinence

Immediately following the birth, some women reported feeling comfortable in their ability to shield the newborn from smoke exposure after discharge from the hospital (Von Kohorn et al., 2012). Another study found women using household smoking bans around the infant to protect the newborn (Kennison, 2009). At 3 months postpartum, women who reported “not knowing what to do for their infants” reported greater concerns for smoking relapse (Gaffney et al., 2008). Other women reported fewer concerns for relapse, even when the infant would cry, if their levels of self-efficacy to remain abstinent were high (Gaffney & Henry, 2007). Higher levels of parenting motivation were related to lower levels of relapse risk up through six months postpartum (Heppner et al., 2011).

1.3.8.2 Support Issues as Predictors of Relapse or Abstinence

Women reported receiving fewer messages from family, friends or health care professionals, to abstain from smoking and felt they received less social support on the topic over the first 6 months of postpartum (Nichter et al., 2008). Lack of social support to remain abstinent was repeated in another set of interviews during the first 4 months of postpartum (Ripley-Moffitt et al., 2008). Efforts to quantify perceived changes in support over the first 6 months postpartum were reported for 65 women (Park, Chang, Quinn, Ross, et al., 2009). The amount of smoking-

specific support received by these women was correlated with their smoking status at 24 weeks postpartum.

1.3.8.3 Affect Issues as Predictors of Relapse or Abstinence

When postpartum relapse occurred, some women reported a negative affect associated with the postpartum period but could not identify the source of these feelings (Psaros et al., 2012). Evaluation of various conceptual models of relapse showed that socioeconomic status impacted negative affect which led to relapse (Businelle et al., 2013). Analysis of PRAMS data (N = 2566) from 16 states reported an increased risk of postpartum relapse if depressive symptoms were present (Allen et al., 2009). Analysis of Minnesota PRAMS data (N = 1416) did not demonstrate an association between mood, stress, or depressive symptoms and an increased risk of relapse (Gyllstrom et al., 2012). Studies with smaller sample sizes, 65 and 87 respectively, produced higher rates of relapse when negative affect or depression symptoms were increased (Park, Chang, Quinn, Regan, et al., 2009; Solomon et al., 2007). Both of these studies followed women for 24 weeks postpartum; however, another study with the same follow-up period (Correa-Fernandez et al., 2012) reported slightly different findings. On initial analysis, the presence of depression or anxiety symptoms predicted increased risk for relapse; however, after adjustment for depressive symptoms, only the presence of anxiety symptoms predicted relapse. This same group of investigators found that a woman's level of self-efficacy to manage negative situations mediated the effects of depression or anxiety symptoms on postpartum relapse (Correa-Fernandez et al., 2012).

1.3.8.4 Weight Issues as Predictors of Relapse or Abstinence

The relationship between weight concerns and smoking relapse in the postpartum period has been a topic of several research studies over the past ten years. Confidence in one's ability to manage weight has been associated with motivation to remain abstinent (Levine et al., 2006). No differences in concern for smoking-related weight changes in the postpartum were noted in black versus white pregnant women (Levine et al., 2008). Finally, in a longitudinal study of 183 postpartum women, level of smoking-specific weight concerns predicted smoking status in the postpartum period (Levine et al., 2010).

1.3.8.5 Temptation and Motivation Issues as Predictors of Relapse or Abstinence

During interviews immediately after the birth of the child, some women reported a fear of being tempted to return to smoking by members of their social network (Nguyen et al., 2011). Other women, also in the immediate postpartum period hospitalization, reported a belief in their personal self-control to continue their smoking abstinence when they left the hospital (Von Kohorn et al., 2012). Applying the acquisition phase of the Stages of Change to women at 2 months postpartum, certain identified clusters were predictive of higher relapse risk (Simonelli & Velicer, 2012). The Risk Denial cluster (average temptation level, high level for pros of smoking, low level for cons of smoking) was 3.5 times more likely to relapse by 2 months postpartum. The High Risk cluster (high temptation level, high level for pros of smoking, average level for cons of smoking) was 4.3 times more likely to relapse by 2 months postpartum (Simonelli & Velicer, 2012). Results from interviewing women who relapsed over the first 6 months after delivery revealed that environmental and physiological triggers were blamed (Park, Chang, Quinn, Regan, et al., 2009). Over that same time span, a commitment and a desire to maintain abstinence

(conceptually defined as global motivation) was predictive of smoking status (Heppner et al., 2011).

1.3.9 Summary of Integrated Review

For this review, the major outcome of interest was postpartum smoking status investigated using various design approaches, measures of smoking status, sampling, and duration of follow-up. Five categories of risk factors or predictors were identified: infant issues, support issues, affect issues, weight issues, and temptation and motivation issues. Unfortunately, the evidence for the direction of impact on postpartum smoking status for many of these predictors is inconsistent which makes the development of successful interventions to prevent postpartum relapse to smoking difficult.

1.4 Overview of Relapse Prevention Interventions

1.4.1 Interventions: Ineffective for Smoking Relapse Prevention

Provision of counseling during the inpatient postpartum stay was not beneficial at 1 month after delivery (DiSantis et al., 2010); nor was the provision of relapse prevention counseling at the 2 or 4 month newborn check-up (Van't Hof et al., 2000). Face-to-face counseling, during prenatal office appointments, did not show a benefit on abstinence rates in the postpartum period (Pbert et al., 2004); nor did counseling via telephone calls to the woman and her designated support person over the pregnancy and up through 12 months postpartum period (McBride et al., 2004). Even the

addition of psychotherapy to telephone call support was ineffective in preventing relapse at 6 months postpartum (Morasco et al., 2006).

1.4.2 Interventions: Effective for Smoking Relapse Prevention

Four intervention trials showed a significant reduction in postpartum smoking relapse for those in the intervention group. A combined approach of counseling during the postpartum hospitalization, as well as a home visit and telephone calls during the postpartum period, was successful at preventing relapse at 3 and 6 months postpartum (French et al., 2007). Provision of incentives and regular biochemical verification of smoking status in the postpartum demonstrated significant results at 3, 6 and 12 months postpartum (Gadomski et al., 2011). A separate study (Yoon et al., 2007) explored the use of incentives, in the form of vouchers, in relation to the concept of impulsivity (the association of a reward's value and the timing of receipt of the award) within the postpartum period; and found that at 24 weeks postpartum, the woman's prenatal level of delay discounting (ability to see the value of an award even with a long delay until receipt of the award) was effective in predicting postpartum smoking status. The only study completely dependent on patient action, in the form of a self-help intervention, examined the use of educational booklets for relapse prevention (Brandon et al., 2012). Ten booklets (averaging 15 pages in length) were developed to address partner support, health issues of smoking, new motherhood changes and concerns, stress and mood, and weight concerns (Quinn et al., 2006). A significant treatment effect was noted at 8 months postpartum.

Several points to consider when designing interventions are the smoking status of the support people surrounding the woman, the need for continued social support encouraging abstinence, acknowledgement of the time and effort required to maintain abstinence, and

establishing a plan to prevent relapse while the woman is in the third trimester of pregnancy (Fang et al., 2004). Additional suggestions for creating the optimal environment for prevention of postpartum smoking relapse involve interactions with the woman to develop her intrinsic motivation to remain abstinent and prepare her for potential triggers (sleeplessness, mood changes, weight concerns and infant crying) to smoking resumption after the birth (Mullen, 2004). In general, the most feasible and effective interventions to achieve and sustain long-term smoking abstinence through the transition to motherhood are still unknown.

1.5 Implications for Future Research

There is still a gap in our understanding of the dominant psychosocial process of abstaining from smoking and preventing relapse to smoking in the postpartum period according to the stages of the transition to motherhood, including identification of the facilitators and barriers to continued smoking abstinence, and potential strategies to aide in smoking abstinence and relapse prevention. Further naturalistic inquiry is a way to gain such an understanding by seeking the perspectives of women who are facing the challenges of preventing relapse as they transition to motherhood.

1.6 Overview of Theoretical Foundations of Smoking Behavior Research

Postpartum smoking relapse is recognized as a major health concern, thus the need for an explanatory conceptual framework to guide the development of more effective interventions is critical. Sustained behavior change is difficult for many people. Some general strategies for

preventing relapse to smoking have been identified as useful by postpartum women¹. These include developing intrinsic motivations to remain abstinent and preparing for potential smoking triggers (e.g. sleeplessness, mood changes, weight concerns, and infant crying) (Mullen, 2004). This review was conducted to assess the adequacy of four conceptual models regarding smoking and preventing relapse to smoking in the postpartum period.

1.6.1 Methods

Four electronic literature databases (CINAHL, Cochrane Library, Ovid PsycINFO, and PubMed) were searched in December 2012, September 2014, and again in June 2019 for articles related to postpartum relapse to smoking. Search terms were individualized for the specific databases and included postpartum smoking relapse prevention; pregnancy and postpartum, postnatal period, postpartum period; tobacco smoking, smoking cessation; and recurrence, relapse prevention, smoking relapse prevention, recurrence/prevention and control. Inclusion criteria were English language and stated goal to provide a comprehensive description of the entire experience of postpartum smoking relapse prevention. Reports that had a targeted focus on postpartum relapse were excluded. Four conceptual models, published from 2001 onward, met the criteria and were included in this review.

Any discussion of a conceptual model, framework, or theory should include a process for evaluation. A systematic approach can aid in determining if a theory is useful and provides an explanation for some phenomenon. Various characteristics have been identified as important

¹ Use of the term “women” is meant to be inclusive; this author recognizes persons may have varying gender identities.

components of an evaluative review for scientific theories (Jaccard & Jacoby, 2010). The concepts, variables, and relationships included in each model were identified and each model was evaluated according to established criteria, including an assessment of its utility, validity, parsimony, ease of communication and appropriateness of scope (Jaccard & Jacoby, 2010). Utility, defined as the ability to enhance understanding of the experienced world, is the primary criterion for evaluating a theory. Validity takes three different forms: expert validation refers to support for the theory in the scientific community; internal validity refers to the ability of a theory to logically predict the unknown of a situation; and empirical validation refers to the ability of a theory to be tested. The last criteria relate to the functionality of the theory and include parsimony, referring to the simplicity of the explanation for the phenomenon of interest; communicability, referring to the ability of the theory to be easily understood, discussed, and assimilated into the scientific field; and scope, referring to the ability of a theory to provide a broader explanation of an unknown phenomenon.

1.6.2 Review of the Conceptual Models

The four conceptual models² selected for review included: Theory of Planned Behavior and Postpartum Smoking Relapse (Gantt, 2001), Model for Postpartum Smoking Resumption Prevention (Pletsch, 2006), Postpartum Smoking Abstinence and Smoke-Free Environments (Ashford et al., 2011), and Smoking Abstinence, Self-Efficacy and Becoming a Mother (Gaffney,

² These models of postpartum smoking relapse prevention were developed through observations of mostly “western society” mothering and cultural norms, which may not be applicable to the current diversity of cultures and ethnicities (Koniak-Griffin et al, 2006; Rubin, 1967).

2006). Narrative explanations and discussion of each model are provided, as well as an evaluation of the concepts, variables, and relationships inherent in each model. Identification of the concepts, measurement variables, and purported relationships within each model are listed in Table 4.

Table 4 Concepts, Measures/Variables, and Purported Relationships of Reviewed Models

	Theory of Planned Behavior and Postpartum Smoking Relapse (Gantt, 2001)	Model for Postpartum Smoking Resumption Prevention (Pletsch, 2006)	Smoking Cessation Model for Childbearing Women (Ashford et al., 2011)	Smoking Abstinence, Self-Efficacy and Becoming a Mother Conceptual Framework (Gaffney, 2006)
Concepts	<ul style="list-style-type: none"> - Attitudes toward postpartum smoking - Subjective norms toward postpartum smoking - Perceived behavioral control of postpartum smoking - Intentions toward postpartum smoking 	<ul style="list-style-type: none"> - Biobehavioral factors or intrinsic motivation for postpartum abstinence - Pregnancy-specific factors or extrinsic motivation for postpartum abstinence - Co-conditional factors or intrinsic / extrinsic motivation for postpartum abstinence 	<ul style="list-style-type: none"> - Child's health as motivation - Desire for smoke-free environment - Changes in perception of smoking - Abstinence as lifelong change 	<ul style="list-style-type: none"> - Motivation for caregiving - Feelings toward caregiving - Expectations of caregiving - Beliefs in caregiving - Intentions toward caregiving
Measures/ Variables	<ul style="list-style-type: none"> - Sociodemographic characteristics - Degree of nicotine addiction - Smoking history - Partner's smoking history - Infant feeding style - Parity - Prenatal weight gain - Level of prenatal care - Timing of prenatal cessation 	<ul style="list-style-type: none"> - Level of nicotine dependency - Stage of behavior change - Level of abstinence self-efficacy - Concerns for health of fetus / newborn - Issues with sensory changes related to tobacco use - Depression concerns - Body weight concerns - Status of household smoking - Status of available support for abstinence 	<ul style="list-style-type: none"> - Maternal nutrition - Infant feeding style - Awareness of typical changes during postpartum - Exercise & coping techniques - Perception of body image - Availability of support system 	<ul style="list-style-type: none"> - Commitment, attachment, and preparation for newborn birth - Acquaintance, learning, and physical restoration after newborn's birth - Adaption into new normal role of mother - Transformation into a competent and confident mother
Purported Relationships	<ul style="list-style-type: none"> - Intentions lead to postpartum smoking abstinence or relapse - Intentions affected by attitudes, subjective norms, and perceived behavioral control - Perceived behavioral control may also lead to postpartum smoking abstinence or relapse 	<ul style="list-style-type: none"> - All listed variables combine to create an individual risk profile for postpartum smoking abstinence or relapse 	<ul style="list-style-type: none"> - Focus on child's health and change in perception of tobacco use interact - Focus on child's health and change in perception of tobacco use affect maternal relapse prevention behaviors 	<ul style="list-style-type: none"> - Desire to be good caregiver may lead to cessation activities - Infant characteristics and low self-efficacy concerns (related to mothering or tobacco) may lead to relapse - Stressful integration of child and life routines, and low coping skills may lead to relapse

1.6.2.1 Theory of Planned Behavior and Postpartum Smoking Relapse

The Theory of Planned Behavior (Ajzen, 1991) has guided the work addressing different types of health behavior change. The theory includes identification of the causal antecedents of the behavior in question. Gantt (Gantt, 2001) applied the Theory of Planned Behavior to postpartum smoking relapse. Gantt's version considers the behavior of abstaining from smoking in the postpartum period as conceptually different from abstaining during pregnancy or other times in a woman's life. Following the birth of a child, a woman's priorities change as does her attitude towards tobacco use. Gantt further posits that interventions targeting postpartum smoking relapse prevention have been ineffective because these changes for women have not been acknowledged or addressed. According to Gantt, a woman's intentions are the main determinants of postpartum smoking abstinence or relapse; a woman's attitudes, subjective norms and perceived behavioral control regarding postpartum smoking decision-making all affect her intentions regarding abstinence or relapse.

1.6.2.2 Model for Postpartum Smoking Resumption Prevention

According to Pletsch (Pletsch, 2006), characteristics pertinent to smoking relapse include the traits of the individual and the environment. When the "former" smoker is a pregnant or postpartum woman, Pletsch's model claims that many other factors are also relevant to the abstinence – relapse struggle. Key concepts, variables, and relationships for this model are listed in Table 4. According to Pletsch, motivation is an important aspect of behavior choice and is composed of two parts: the intrinsic or self and the extrinsic or environment. For postpartum smoking relapse prevention, Pletsch identified additional motivational factors, namely pregnancy-specific motivational factors. For relapse prevention activities to be successful, the model posits

that counseling should be matched to the woman's individual motivational factors. An intrinsic factor could be level of nicotine dependency while a pregnancy-specific factor might be sensory changes during pregnancy. Pletsch's model recommends the use of several tools to assess a woman's risk for postpartum smoking relapse.

1.6.2.3 Smoking Cessation Model for Childbearing Women

This is the only model reviewed that described the process by which it was developed (Ashford et al., 2011). Ashford and colleagues interviewed 16 postpartum women from a cognitive-behavioral mental health intervention study to identify motivators for continued abstinence in the postpartum period and the personal and/or lifestyle characteristics of women who remained abstinent. The themes from the analysis of the interviews became the concepts, measurement variables, and purported relationships of their model and included the primary motivators (demand for a smoke-free environment), personal characteristics (perception of smoking now negative), and lifestyle trends (awareness of postpartum stressors) of women maintaining postpartum abstinence. This model purports that maternal health status (relapse prevention) is influenced by an altered thought process regarding tobacco use and a focus on improving the child's health.

1.6.2.4 Smoking Abstinence, Self-Efficacy and Becoming a Mother Conceptual Framework

In 2006 Gaffney described a model that merged two existing theories: the Relapse Prevention Model (Marlatt & Witkiewitz, 2005) and Becoming a Mother (Mercer, 2004). Gaffney's model (Gaffney, 2006) purports that women in the postpartum period experience similar challenges that all former smokers face in their attempts to sustain continued abstinence plus additional challenges brought on by the changes associated with motherhood. According to

Gaffney, the key points of the Relapse Prevention model are relevant to women in the perinatal period, namely a woman's response to an encountered trigger will depend on her smoking abstinence self-efficacy. The transition to motherhood involves various changes to self-identity and personal relationships and Mercer (2004) identifies four progressive stages starting during pregnancy and extending until approximately four months postpartum. Gaffney's model intertwines the stages of becoming a mother and the internal working model of caregiving (Pridham et al., 1999) and identifies points during the postpartum transition when women may be more vulnerable to relapse. Unfortunately for many women, relapse to smoking occurs prior to their successful attainment of the role of mother, a time when they are competent and confident in their abilities to love, protect, and nurture their child (Mercer, 2004).

1.6.3 Discussion of the Conceptual Models

Components of these four models (concepts, measures/variables, and purported relationships) were compared and contrasted. A woman's motivation (Pletsch, 2006) and intentions (Gantt, 2001) towards continued abstinence in the postpartum period are the foundational relationships in the two models specifically geared to postpartum smoking relapse prevention (Pletsch's Model for Postpartum Smoking Resumption Prevention and Gantt's Theory of Planned Behavior and Postpartum Smoking Relapse). Several other variables of the postpartum period are common to both models (see Table 4) and identified as important factors in relapse prevention. The two above authors claim that the concepts and relationships posited in their respective models would be useful for guiding the development of instruments to assess key factors related to relapse prevention, such as intention or motivation regarding future tobacco use and availability of social support for abstinence, and then use these factors to design interventions to

support abstinence while the woman is still pregnant and engaged with the healthcare team. While starting the assessment process early may be advantageous for both the woman and her providers, in the prenatal period women are still attempting to project their responses to and issues with a situation they have yet to experience – the birth of their child, the changes in their daily roles, and any other challenges of the postpartum period. Furthermore, no follow-up reports for these models were found detailing the development of any assessment instruments or interventions to prevent smoking relapse in the postpartum period.

Many aspects and challenges associated with the postpartum period are included in both the Smoking Cessation Model for Childbearing Women (Ashford et al., 2011) and the Smoking Abstinence, Self-Efficacy and Becoming a Mother Conceptual Framework (Gaffney, 2006). These include decision-making regarding newborn care and maternal care. Another similarity between the two models involves the recognition that while smoking cessation may have been initiated during pregnancy and motivated by concern for the fetus, successful long-term maintenance of smoking abstinence following childbirth may be rooted in other concerns or motivators. This approach acknowledges the uniqueness of relapse in the postpartum period and both models posit concepts to explain postpartum relapse and its prevention. For Ashford's model (2011), the key components of relapse prevention are a change in the woman's perception of smoking and her acceptance of abstinence as a lifelong change. Unfortunately, the Ashford model is somewhat static as an explanatory framework and fails to address the incredibly dynamic postpartum period. For Gaffney's model (2006), the core of relapse prevention rests with a successful transition to motherhood, which supports her self-efficacy for abstinence and ability to cope with stressful situations. Throughout the first year after childbirth, both mother and child will achieve several milestones and encounter multiple challenges. The transition into motherhood is an encompassing

framework for understanding the reality every new mother face after the first birth and with each succeeding new addition to the family. Combining the transition into motherhood with an understanding of “traditional” relapse prevention strategies (identification and preparation for high-risk or triggering situations by bolstering coping mechanisms) leads to the addition of a time-related component to the interpretation of postpartum smoking relapse prevention. The needs and challenges of relapse prevention at 2-months postpartum may not be the same at 8-months postpartum. Gaffney’s model (2006) recognized postpartum smoking relapse prevention as a dynamic process, with milestones and stages to consider.

1.6.4 Evaluation of the Conceptual Models

A good theory should meet certain criteria including provide better understanding (utility), be accepted by the scientific community (expert validation), agree with previous and current knowledge (internal validation, allow for discussion and testing (empirical validation), and avoid explanations that are too broad or narrow (parsimony) (Jaccard & Jacoby, 2010). A solo and independent review of each model of postpartum relapse to smoking was completed (by SB) to identify the presence or absence of seven important characteristics within the model’s description and application in the literature. The results of the evaluation of these four conceptual models, based on the Jaccard and Jacoby criteria, are discussed below and indicated in Table 5.

Table 5 Evaluation of Four Models of Postpartum Smoking Relapse

Evaluation Criteria used from Jaccard and Jacoby (2010)	Gantt (Gantt, 2001)	Pletsch (Pletsch, 2006)	Ashford (Ashford et al., 2011)	Gaffney (Gaffney, 2006)
Is there utility in the model?	Yes	Yes	Yes	Yes
Is there expert validation for the model?	Yes	Yes	Yes	Yes
Is there internal validation for the model?	Yes	Yes	Yes	Yes
Is there empirical validation for the model?	No	No	No	Yes
Is the model parsimonious?	No	No	Yes	Yes
Is the model easily communicated?	No	No	Yes	Yes
Is the scope of the model appropriate?	Yes	Yes	Yes	Yes

1.6.4.1 Theory of Planned Behavior and Postpartum Smoking Relapse

Four articles cited Gantt’s model (2001). Three studies (Ben Natan et al., 2010; Nguyen et al., 2011; Von Kohorn et al., 2012) used Ajzen’s theory (1991) to construct an instrument to assess smoking behavior during the perinatal period and to guide analysis of interview data. While there is utility in Gantt’s posited model, as well as expert validation, internal validation, and appropriate scope for this interpretation of postpartum smoking relapse prevention, the number of concepts and variables in the model diminishes the parsimony of the theory. While only three main concepts are in Ajzen’s model (1991), multiple assessment strategies are suggested for interventional implementation to focus and individualize the results for relapse prevention in Gantt’s model (2001). This labor-intensive process may be accommodated in the prenatal period but then the context-specific factors of the postpartum period in relation to potential smoking relapse have yet to be encountered. The model’s abstract concepts for describing potential relapse or continued abstinence may not be easily communicated to a new mother or her family. In addition, published empirical validation, in the form of intervention-driven studies, of this model applied in the context of postpartum smoking decision-making are lacking.

1.6.4.2 Model for Postpartum Smoking Resumption Prevention

Three articles cited Pletsch's model (2006). One explored some of the sensory changes during pregnancy associated with an aversion to tobacco and how quickly those aversions can disappear after the birth (Pletsch et al., 2008). The other two articles (Constantine et al., 2014; Prady et al., 2012) cited Pletsch's model as evidence that individualized assessment of needs in the postpartum period may be useful for adolescents and adults with differing marital status as the women try to maintain smoking abstinence. Pletsch's interpretation of postpartum smoking relapse prevention has utility, expert validation, internal validation and appropriate scope. A potential lack of parsimony and inability to easily communicate the model's concepts to the woman and her family may be encountered based on the large number of concepts and variables in the model. Proposed activities suggest that multiple strategies and stages of assessment, to develop an individualized intervention for relapse prevention, are occurring while the woman is still maintaining her prenatal smoking abstinence. While an intervention derived from this model has not been tested, the proposed strategies (face-to-face interviews and telephone contacts) have been tested multiple times with little long-term success in preventing relapse to smoking in the postpartum period.

1.6.4.3 Smoking Cessation Model for Childbearing Women

A qualitative study of postpartum intentions toward smoking status (Von Kohorn et al., 2012) highlighted this model (Ashford et al., 2011) as an example of the need to refocus efforts on postpartum abstinence after the birth has occurred. This same study also used Gantt's adaption (Gantt, 2001) of the Theory of Planned Behavior (Ajzen, 1991) to guide analysis of qualitative interviews with postpartum women. Other than a lack of empirical validation, since no published

intervention studies using this model were found, the other six evaluative criteria are successfully addressed within this model.

1.6.4.4 Smoking Abstinence, Self-Efficacy and Becoming a Mother Conceptual Framework

Three articles cited this model (Gaffney, 2006). One (Page et al., 2012) reinforced the premise of smoking abstinence during pregnancy as being a behavior suspension, rather than a behavior change. Another report of an intervention study (Reitzel et al., 2010) reviewed this model within the background section but did not use this model as the conceptual framework for the study. The final article citing this model included Gaffney as a co-author and used the model as the conceptual framework for a descriptive study undertaken to identify factors of motherhood that might contribute to smoking relapse, such as prenatal intention for postpartum smoking status and maternal response to infant crying episodes (Gaffney & Henry, 2007). This model successfully met all seven evaluative criteria.

1.6.5 Implications

A hallmark for maternity nursing care is the anticipatory guidance that is provided to all women preparing for the transition to motherhood. Most women who quit smoking during pregnancy will need guidance to prepare for the challenges of preventing smoking relapse in the postpartum period. Before delivery, each woman should be helped to identify external variables and risk factors that may play a role in her attempts to remain abstinent after delivery (Gantt, 2001; Pletsch, 2006). Pletsch's model (2006) provides a listing of many characteristics and assessment instruments potentially useful in the identification of personal postpartum relapse risk factors, while Gaffney's (2006) introduction of the stages of becoming a mother may help prepare women

to recognize critical time points and potential high-risk triggers during the postpartum period. Pletsch's (2006) posited primary motivators and Ashford's (2011) posited postpartum lifestyle trends supportive of postpartum abstinence suggest many different avenues for potential interventions. Two of these topics, postpartum mood issues and postpartum weight issues, are explored in greater detail in a model showcasing the relationships among these specific factors and postpartum smoking relapse (Levine & Marcus, 2004).

Lengthy assessments (Pletsch, 2006) and creation of a personal, 7-subscale instrument (Gantt, 2001) to aid in the prevention of postpartum relapse may not be the most helpful to a woman trying to find her balance as a new mother. Continuing to place emphasis on behavior change for the sake of the newborn (Ashford et al., 2011) may not be useful if women erroneously believe they can return to smoking and protect the child from secondhand smoke effects. For all the evaluated models, Gaffney's is the only model of postpartum smoking relapse prevention (2006) to recognize the passage of time during the postpartum period. Two individuals are transformed during the postpartum period: the woman and the newborn. The mother is healing from the birth, acquainting herself with her child, and assuming the role of mother. The newborn is growing and developing, transitioning through multiple milestones during the first year of life. Gaffney's model (2006) acknowledges these touchstones in development for both the mother and the child. A better understanding of smoking decision-making (abstinence or relapse) within the context of the transition to motherhood is crucial for designing successful long-term interventions for postpartum smoking relapse prevention. Education on topics related to maternal and newborn challenges, potential triggering events for relapse, may be more effective if directed at crucial time points. Matching educational needs to critical points along the postpartum timeline may increase maternal self-efficacy and therefore decrease reliance on smoking for positive reinforcement.

Listening to how women describe their transition during the postpartum period may be an important first step to developing effective smoking relapse interventions to thwart this complex public health problem.

2.0 Preliminary Studies

Investigation of a complicated healthcare issue, such as potential relapse to smoking in the postpartum period, requires a deeper review of the situation from a quantitative and qualitative viewpoint. Two studies were conducted by SB during the PhD program to explore separate facets of this complicated issue within a targeted population – smoking among postpartum women in Pennsylvania. Study 1, a qualitative secondary analysis (unpublished), was conducted using an existing dataset collected from two focus groups of postpartum women. Study 2, a quantitative secondary analysis (published), was conducted using an existing dataset (Pennsylvania Department of Health's [PA DOH] PRAMs files for 2011) collected from randomly selected postpartum women across the state of Pennsylvania for 2011 (Bare, 2017).

The purpose of the qualitative study was to explore the tasks, needs, and challenges associated with tobacco use in the perinatal period. Additionally, this exercise provided an opportunity to practice qualitative research techniques, specifically coding and analysis of transcripts from focus group discussions. Development of the necessary skills for analysis of qualitative data was crucial to the eventual completion of the dissertation study. The purpose of the quantitative study was to identify significant prenatal predictors of postpartum relapse to smoking, specifically for the general population in Pennsylvania. This knowledge informed several aspects of the dissertation study, including the creation of the demographic data collection form, and identification of characteristics to consider during sampling and enrollment for the full dissertation study.

2.1 Study 1. Postpartum Relapse to Smoking During New Motherhood: Secondary Analysis of Focus Group Data

2.1.1 Introduction

To date some demographic predictors of postpartum relapse to smoking have been identified including race, ethnicity, education level, socioeconomic status, and relationship status (Martin et al., 2008). Other potential risk factors for relapse include infant care concerns, availability of social support, affect or mood during the postpartum period, and body image or weight issues (Levine et al., 2010; Reitzel et al., 2007; Solomon et al., 2007).

For this qualitative secondary analysis, three aims were identified: (1) to describe the tasks, needs, and challenges associated with tobacco use in the perinatal period, (2) to detail the trajectory of tobacco use in the perinatal period, and (3) to identify any convergence of themes and trajectories for the research participants. These aims support the overall purpose of developing a better understanding of postpartum relapse to smoking.

2.1.2 Methods

We conducted a secondary analysis of qualitative data obtained from two focus groups that were conducted at the University of Pittsburgh as part of a primary study (STAYQUIT Moms, PI: Levine). The aim of the primary study was to develop and evaluate a new Internet-based program to aid in the prevention of postpartum smoking relapse. Convenience sampling was used to recruit nine postpartum women from the greater Pittsburgh area who had a history of tobacco use. The women participated in a focus group anywhere between 12-weeks to 12-months after

birth. By design, women were recruited for one of two separate focus groups based on current smoking status. Topics explored during the focus groups included: cessation efforts during pregnancy, triggers for relapse following childbirth, challenges encountered in the postpartum period, and current smoking status. Institutional Review Board approval for the focus group study was obtained through the University of Pittsburgh. Secondary analysis of qualitative data may be useful to pursue an interest that is independent of the aims of the primary study but still closely aligned (Sherif, 2018). Qualitative secondary analysis ensures existing data is not underused and that research participants may not needlessly revisit previously discussed sensitive topics (Hinds et al., 1997).

All focus group sessions were audio-recorded, transcribed, and reviewed for accuracy. Atlas.TI (version 7.1.8, Scientific Software Development) was used for data management. Two coders independently conducted line-by-line coding. Constant comparative analysis during repeated reviews of the transcripts provided opportunities for refinement and adjustment of identified codes (Hinds et al., 1997). Available demographic data was used to describe the sample. Themes describing the tasks, needs, and challenges associated with tobacco use in the perinatal period were identified. Women's accounts of their smoking behaviors were used to detail distinct trajectories of tobacco use during the perinatal period. Finally, any possible convergence of themes and trajectories were identified in a matrix reflecting data from all research participants.

2.1.3 Findings

2.1.3.1 Sample Characteristics

The characteristics of the women who participated in the focus groups (n =9) are summarized in Table 6. While equally divided into the racial categories of white and black,

the women were predominantly non-Hispanic (n=7) as well as primiparous (n=7). An equal number of women (n=4) had ≤ 12 or ≥ 16 years of education. The majority (n=7) reported having a partner (significant other or husband) assisting with parenting responsibilities. Three of the women were living in a household with an annual family income of over \$70,000; another four were living on less than \$20,000 per year which is considered at the poverty line for a family of three (U.S. Department of Health and Human Services, 2015) (U.S. Department of Health and Human Services, 2015). At the time of the two focus groups, four women were abstinent, two women reported a return to daily tobacco use, and three women classified their smoking behavior as occasional or social.

Table 6 Sample Characteristics (N=9)

Characteristics	n (%)
Primiparous	7 (78)
Non-Hispanic ^a	7 (88)
Race ^b	
Black	5 (56)
White	5 (56)
Education	
Less than HS diploma	1 (11)
HS graduate	3 (33)
Some college / technical school	1 (11)
Undergraduate degree	3 (33)
Post-graduate degree	1 (11)
Relationship status	
None	1 (11)
Separated	1 (11)
Living together	4 (44)
Married	3 (33)
Total family income	
\$20,000 or under	4 (44)
\$40,000 - \$70,000	2 (22)
\$70,000 or over	3 (33)

^a n=8 participants. ^b one participant selected more than one race.

2.1.3.2 Tasks, Needs, and Challenges Associated with Tobacco Use in the Perinatal Period

Cessation efforts during pregnancy were motivated by critical moments such as the confirmation of pregnancy. Seven women, across all three trajectories, voiced a common **reason for their cessation efforts** - the health of the baby. Participant 6 (first-time mother, lives with significant other) quit smoking as soon as she found out she was pregnant. *"I have always been told....do not smoke while you're pregnant and you see the effects of what can happen. So immediately that was one of the first things I asked the doctor was, how do I do this?"* Participant 3 (second-time mother, married) revealed she did not have any difficulty quitting smoking during pregnancy. *"I found it really easy to quit while I was pregnant. I, the day I found out I was pregnant, I stopped. I had my last cigarette the night before actually. And I quit with my first one also the same way, like as soon as I found out I was pregnant I was just done."*

Many women admitted that the **perceived negative societal attitude** surrounding smoking and pregnancy was a factor in their cessation efforts. Participant 7 (first-time mother, lives with significant other) said, *"It's like you don't want people to look at you and be like, 'Ew, she's smoking when she's pregnant'."* Participant 6 (first-time mother, lives with significant other) said, *"I don't know, that whole image of me pushing a stroller with a cigarette in my mouth just doesn't go hand in hand. I honestly think the whole public stigma really does kind of help in a way."*

Several women reported benefiting from the **support of a partner** for cessation. The women attributed successful cessation and relapse prevention to the lack of readily available cigarettes or exposure to cigarette smoke within the home. Participant 2 (first-time mother, lives with significant other) provided some insight. *"I think it makes a big difference if your boyfriend, husband, whatever, is smoking or not. My husband stayed quit too the whole time. So if he was*

smoking in the house now I think I would be more tempted too. I don't have the desire to smoke now, but if he was, I don't know, maybe I would do it too." Participant 8 (first-time mother, lives with significant other) shared a strong example. *"...And I wasn't allowed no smoking in the house, no anything, no nothing. ... it was pretty easy because I had the support of all my family and they wouldn't smoke around me."*

Strong **negative opinions about smoking from family members** also influenced the women's behaviors during pregnancy. This was true for participant 7 (first-time mother, lives with significant other) whose mother influenced her smoking behavior. *"It's like I'm around my mom a lot too now and she doesn't let me smoke, so there is no sneaking, there is no anything whenever I am with her. So it's like, the more often I keep myself occupied, or go over her house, or invite her over or whatever I'm doing, it's like I – I don't even have the thought anymore."*

Women reported the effect of distraction or **substituting other activities for smoking** on cessation. Three women chose physical activity as a replacement for smoking behavior and all three remained abstinent in the postpartum period. Participant 1 (first-time mother, married) shared, *"I like running more than smoking."* Two women spoke about the use of oral substitutes to smoking, such as chewing gum or eating. In the words of participant 9 (fourth-time mother, married), *"So, whenever I think about a cigarette, I just eat everything."* Two women used breastfeeding or cuddling as a distraction when they wanted to smoke. Participant 8 (first-time mother, lives with significant other) said, *"When I wanna smoke I just pick up my baby."*

The presence or absence of smoking in their home or work environment was an important factor in successful maintenance of smoking cessation for several women. Two women were successful in maintaining their abstinence status; however, they admitted that **proximity to smoking could trigger** a postpartum relapse. Participant 2 (first-time mother, lives with

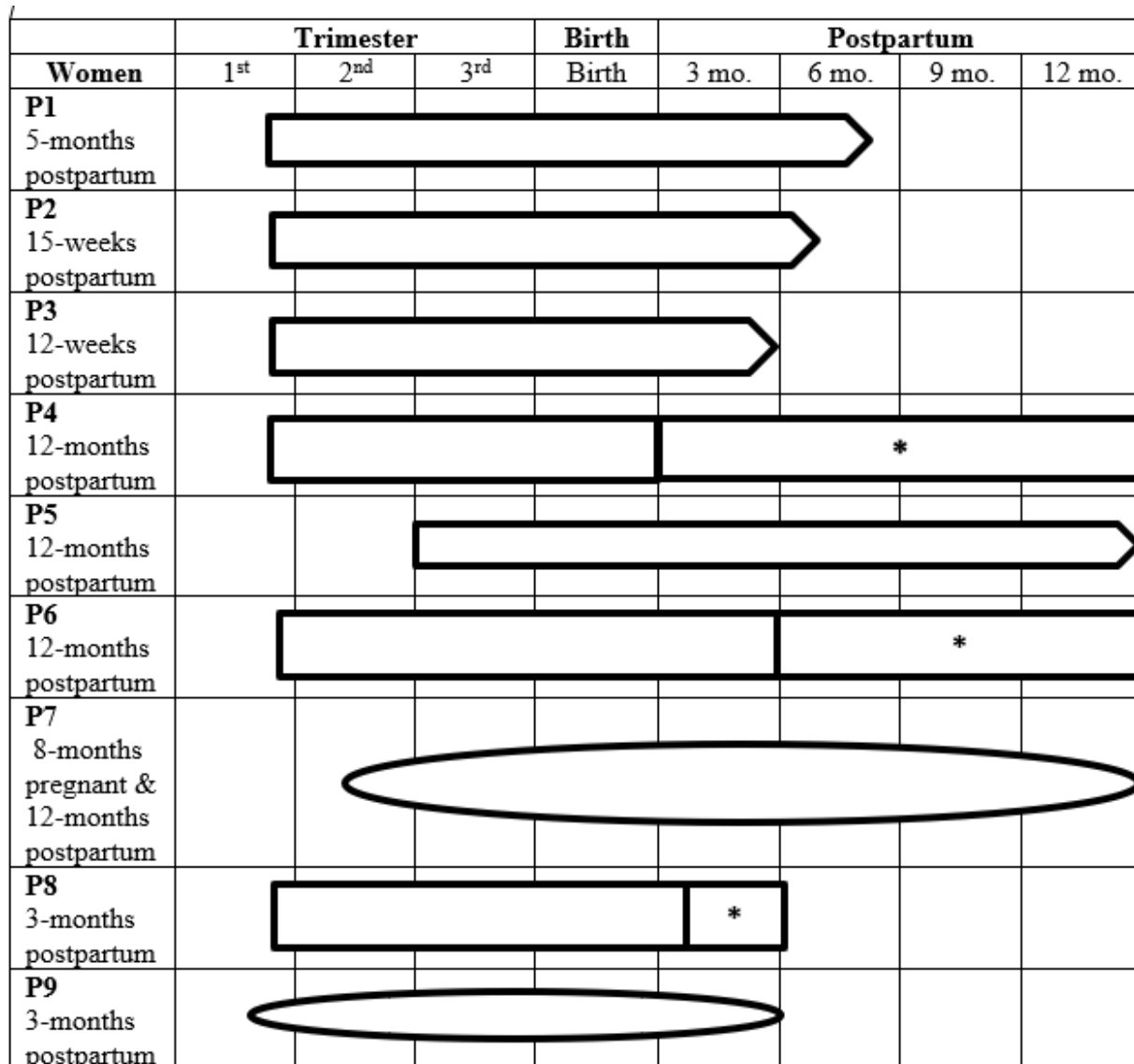
significant other) reported, *"So if he was smoking in the house now I think that I would be more tempted too. I don't have the desire to smoke now. but if he was, I don't know, maybe I would do it too."* Participant 3 (second-time mother, married) said, *"...I haven't had any trouble not starting again because I just started back to work a few weeks ago....I haven't really been in that situation where I was tempted to smoke until recently..."*

Two women consciously returned to situations that they strongly associated with smoking in the past. These women, with either their partners or friends, valued a return to social settings where smoking was accessible and accepted. For these women, abstinence was not maintained. Participant 4 (first-time mother, single) expressed, *"Like I'm out tonight, I don't have to like, know what I mean? Baby's with grandma. So that would be my biggest thing: social smoking;"* and participant 6 (first-time mother, lives with significant other) concurred, *"But, when you did you go out, I always wanted, you know, relief. So other people that were smoking that I've always smoked with, I started again here and there."*


Two women indicated that in the past smoking was used as a coping strategy when they encountered stress. They described the postpartum period as particularly stressful and both women returned to tobacco use within the first three months after the birth. Participant 8 (first-time mother, lives with significant other) expressed, *"But, twice a day I would go out and smoke because I was just so scared and stressed out [with a newborn in the NICU],"* and participant 9 (fourth-time mother, married) shared, *"But I did just pick back up smoking a little bit because I had death in my family....I'm just trying to get over this, killing pain right now. And that's like the only thing that can calm me down."*


2.1.3.3 Trajectories of Tobacco Use in the Perinatal Period

The smoking behavior of each participant is displayed in Figure 2. Three distinct trajectories of Tobacco Use in the Perinatal Period were identified: (1) Trajectory 1: Abstinence in Antepartum and Postpartum (n=4), (2) Trajectory 2: Abstinence in Antepartum, Relapse in Postpartum (n=3), and (3) Trajectory 3: Mixed Perinatal Abstinence and Relapse (n=2).



Trajectory 1  Abstinence in Antepartum and Postpartum (n=4)

Trajectory 2  Abstinence in Antepartum and then Relapse in Postpartum (n=3)

Trajectory 3  Mixed Perinatal Abstinence and Relapse (n=2)

* indicates relapse

Endpoint of shape indicates time of focus group participation

Figure 2 Trajectories of Tobacco Use in the Perinatal Period

Trajectory 1 (Abstinence in Antepartum and Postpartum) included four women who successfully discontinued tobacco use during pregnancy and maintained abstinence into the postpartum period; of these, three were supported by a significant partner or spouse, had a minimum of an undergraduate education, and lived in a household with an annual income of at least \$70,000. Two of the three women categorized by Trajectory 2 (Abstinence in Antepartum, Relapse in Postpartum) relapsed immediately following the birth of their child; both were first time mothers, received some education at the college level, and were living in a household with an income of between \$40,000-\$70,000 annually; one was a solo parent, and one had a partner of two years. Trajectory 3 (Mixed Perinatal Abstinence and Relapse) included two women who reported intermittently smoking before and after the birth; both had supportive partners and were living near the poverty line but only one of these women was a first-time mother.

2.1.3.4 Convergence of Themes and Trajectories of Tobacco Use in the Perinatal Period

Creation of a matrix of themes by trajectories revealed several findings. All participants reported some rationale for their smoking cessation but none of the identified specific rationales for cessation were endorsed by every participant. Most participants (67%) identified some societal influence on their cessation / abstinence efforts. Additionally, five of nine participants reported the availability of some type of social support either in the home or at work. Regardless of the trajectory, use of a replacement for smoking was frequently chosen. Healthy options, such as exercise or spending time with the newborn, were utilized by both those maintaining abstinence (Trajectory 1) and those who relapsed during the perinatal period (Trajectory 2 and Trajectory 3). Situational triggers, such as stress, proximity to smoking, and socializing without the newborn, were more likely to be reported by participants who relapsed (Trajectory 2 and Trajectory 3). Table

7 shows the convergence of themes and trajectories for each participant related to tobacco use during the perinatal period.

Table 7 Matrix of Convergence of Themes and Trajectories for each Participant

Themes	P1 T1	P2 T1	P3 T1	P4 T2	P5 T1	P6 T2	P7 T3	P8 T2	P9 T3
Rationale for cessation									
Cessation for fetus / baby	X	X			X	X	X	X	
Cessation for self-health							X		
Quitting easy during pregnancy			X		X	X		X	
Quitting hard during pregnancy	X	X		X			X		X
Societal influence on cessation & abstinence									
Social stigma of smoking				X	X	X	X		
Me time	X					X			
Secret smoker			X						
Serial quitting during pregnancy			X			X			
Social Support									
Social support		X				X	X	X	
Partner also quit		X				X			
Work smoker			X						
Replacements for smoking postpartum									
Exercise	X		X						
Attention diversion					X	X	X		
Oral / eating						X			X
Newborn care							X	X	
Situational triggers									
Partner or friend smoking		X	X	X		X			
Social setting without newborn				X		X	X		
Stress or difficult family situation							X	X	X

T1=Trajectory 1: Abstinence in Antepartum and Postpartum

T2=Trajectory 2: Abstinence in Antepartum, Relapse in Postpartum

T3=Trajectory 3: Mixed Perinatal Abstinence and Relapse

2.1.4 Discussion and Implications

First-time mothers, women with at least an undergraduate degree, and women living above the poverty level have been shown to be more successful in preventing smoking relapse in the postpartum period (Martin et al., 2008). In this sample four women remained abstinent in

the postpartum period: three of these women were primiparous, educated at a minimum level of an undergraduate degree, and could be classified at the middle-income level. Additionally, solo parenting has been noted as a risk factor for relapse, above the influence of educational level or economic status (Rahkonen et al., 2005). For the five women who relapsed to tobacco use in this sample, three were living in poverty but only one was solo parenting.

Several themes identified in this analysis are consistent with those described in the literature on postpartum relapse to smoking. For this sample of women, a common rationale for quitting was cessation for the sake of the baby, a common need was social support during the postpartum period, and a common challenge was the management of high-risk or tempting situations for smoking resumption.

From the focus group conversations, it was clear that the women felt compelled to stop smoking during pregnancy for the sake of a healthy fetus and due to pressure from society and/or family members. Therefore, many women quit smoking at the time of pregnancy but were these women truly ready for a quit attempt? Successful postpartum relapse prevention may require a refocusing of motivations for cessation from solely for the baby's health to cessation for the mother's health with added benefit to the baby and other family members. Thoughtful consideration and planning for postpartum relapse prevention, while still successfully abstinent during pregnancy, may increase a woman's chance of avoiding relapse to smoking in the postpartum period. Recognition of the personal benefits of being smoke-free may provide motivation for relapse prevention; physical, social, and even financial gains from abstinence may be appreciated during the woman's daily routine.

Both focus groups of postpartum women provided multiple examples of smoking-specific support from significant others or family members during pregnancy but few examples of support

during the postpartum period were revealed. While it appears common for women to receive smoking-specific social support from multiple sources during pregnancy, messages of support from family and friends may be lacking or insufficient in the postpartum period to prevent a relapse to tobacco use. In the postpartum period, decreasing contact with the healthcare team also equates to decreasing support of smoking abstinence from another important source. Women accustomed to smoking as a form of stress-reduction or as a coping strategy were unsuccessful in maintaining abstinence, for this sample of women and in other research populations (Nichter et al., 2008). Relapse prevention, in any context, is difficult and a lack of encouragement for or acknowledgement of this challenge may adversely affect success rates. Healthcare services during prenatal and postnatal care should promote and support the continuum of smoking abstinence and relapse prevention. In addition, the transition to motherhood is unpredictable; realistic preparation for this new role may encourage the development of more effective and health-promoting strategies to meet the challenges of relapse prevention within the postpartum period.

The smoking status of the members of a woman's social network (Nguyen et al., 2011) and her perceived level of self-control to resist temptation (Von Kohorn et al., 2012) may influence her use or avoidance of tobacco in the postpartum period. Spending time with a significant other or friends away from the responsibilities of parenting was important to the women in this sample. Unfortunately for many women, smoking activities play a large role in these moments away from their child. Having the important people around a woman invest in her continued abstinence, especially after the birth has occurred, may assist in preventing relapse if she encounters temptation. Each woman should be encouraged during pregnancy to identify what

her situational triggers or high-risk temptations in the postpartum period may be and consider coping strategies to address these moments that do not involve the use of tobacco products.

Many different smoking replacements were adopted by the women in this sample and within this variety some nuances related to relapse versus abstinence were noted. Within the sample, the women who reported physical activity (Trajectory 1) as a replacement for smoking behavior during pregnancy successfully maintained their abstinence out to 3- and 5-months postpartum. For the women who selected oral substitutes (Trajectories 2 and 3) for prenatal smoking behavior, long-term postpartum relapse prevention was not achieved. Two women described parenting behaviors (Trajectories 2 and 3) such as cuddling and feeding activities as substitutes for smoking activities; while the proximity of the newborn may have prevented specific smoking events, both women were unsuccessful in maintaining long-term relapse prevention.

While these women expressed some interplay between their perinatal tobacco use and new motherhood role, the sample size was limited. Most of the sample was either in the early or late stage of the first postpartum year with few women representing the middle segment of this period (4-months to 10-months postpartum). This timeframe is especially important within the life of the woman and child; a woman acclimates to the role of mother within the first 4-5 months postpartum and the child will achieve numerous important developmental milestones during this time. As commonly occurs in focus group discussions, a "dominant" voice was noticeable in the transcript of the second focus group. In response, "quieter" voices may not have joined the discussion. Finally, data available for this secondary analysis was limited to the transcripts and only limited conversation pertinent to the aims of this report were able to be drawn from the introductory stage of each focus group.

Although this qualitative secondary analysis included only nine women in the postpartum the importance and influence of “society’s opinion” of women who smoke during the perinatal period was clearly evident in the words of these women. The stigma of smoking around their child, either as a fetus or a newborn, is processed as a negative opinion of their parenting ability; a mother who smokes is a bad mother, a bad person. For the future, a wiser choice of action would be to acknowledge these good mothers who may have a bad habit. Postpartum relapse prevention may be more attainable if a woman does not feel like those around her are judging her unfavorably.

2.2 Study 2. Smoking after Pregnancy: Factors Associated with a Relapse to Smoking in Pennsylvania³

2.2.1 Introduction

Most women quit smoking during pregnancy for the health of their unborn children (Flemming et al., 2013; Notley et al., 2015). However, despite overwhelming evidence of the negative health effects of smoking, most women resume smoking after childbirth (Constantine et al., 2014; Notley et al., 2015). Studies have identified certain characteristics that appear to raise women’s

³ This text previously published and reprinted here with permission from the Pennsylvania State Nurses Association. Bare, S.E., DeVito Dabbs, A., & Sereika, S.M. (2017). Smoking after pregnancy: Factors associated with a relapse to smoking in Pennsylvania. *Pennsylvania Nurse*, 2, 4-9.

likelihood of resuming cigarette smoking after quitting during their pregnancy, including an unintended pregnancy, age under 25 years, less than 12 years of education, non-Hispanic black, bottle feeding, and multiparity (Jones et al., 2016). To date, some interventions have been successful in motivating women to abstain from smoking after delivery, but few interventions have resulted in long-term smoking cessation.

Is enough known about which women are at risk for relapse? Why do women who were motivated to quit smoking while pregnant find it so challenging to remain abstinent after their babies are born? To promote the health and wellness of women, children, and families, there needs to be an understanding of the predictors of post-partum tobacco use which can be used to target relapse.

2.2.2 Background

For 2007-2010, women of child-bearing age residing in the Commonwealth of Pennsylvania tended to smoke at higher rates (15.0% during the last three months of pregnancy and 21.7% within four months postpartum) than residents of approximately 26 other states in the U.S. (12.1% during the last three months of pregnancy and 17.1% within four months postpartum). During this same time, the smoking cessation rate during pregnancy for Pennsylvania women was 47.1% (Tong et al., 2013). While cessation during pregnancy is encouraging, the reality is that smoke-free behaviors are rarely sustained after delivery. Nationwide, the associated smoking relapse rate was 47.2%. For Pennsylvania, the postpartum relapse rate was 52.2% (Rockhill et al., 2016).

During the first year after the birth of a child, women face challenges and stressors, some of which may be anticipated by new mothers, but many are not. These daily stressors of

motherhood are thought to contribute to relapse to smoking after the birth. While several non-modifiable maternal sociodemographic characteristics have consistently been associated with postpartum smoking relapse, including maternal age, race, and education level (Rockhill et al., 2016), contradictory evidence for an association between relapse and other potentially modifiable predictors exist, including maternal mood, level of stress, and partner or household smoking status (Levine et al., 2016; Rockhill et al., 2016). The purpose of this study was to identify significant perinatal predictors of relapse to smoking reported by women in Pennsylvania in the hope of gaining a better understanding of factors to target to reduce the incidence and negative impact of smoking relapse on new mothers, their newborns, and families.

2.2.3 Methods

This study analyzed data from the Pregnancy Risk Assessment Monitoring System (PRAMS, <https://www.cdc.gov/prams/index.htm>), a population-based surveillance system initiated in 1987 by the Centers for Disease Control and Prevention (CDC) to monitor and promote perinatal and newborn health (Centers for Disease Control and Prevention, 2008). New mothers are requested to complete the one-time survey within the year following the birth. The CDC-PRAMS protocol defines how to randomly generate the list of women to be sampled each month from the state birth certificate registry and the various methods used to promote completion of the surveys. Two sources of information comprise the PRAMS dataset – data from birth certificates and PRAMS surveys. In addition, the dataset includes weighting variables generated by CDC so that results can be generalized beyond the sampled women and to compare results across participating states. New York City and 39 states participate in the PRAMS protocol, including the Commonwealth of Pennsylvania that joined the PRAMS network in 2006 and began administering

the surveys in 2007. Based on a written request to the Pennsylvania Department of Health (PA Dept of Health), Bureau of Health Statistics and Research, we were given access to the most current PRAMS data at the time of the project (2011) (Department of Statistical Registries, 2014). The dataset was de-identified and thus included no distinguishing personal data or identifiers from the participating women. The University of Pittsburgh Institutional Review Board reviewed and approved the study.

The PA dataset included information from 1,080 postpartum women (cases). Because of large amounts of missing data (up to 15% per case), 19 cases were removed leaving 1061 cases. Since the purpose of this study was to identify potential predictors of postpartum relapse to smoking, only women who reported smoking before their pregnancy and abstaining during the pregnancy were eligible resulting in 145 cases for this analysis.

Of the 319 variables included in the PRAMS dataset, 24 variables were selected for inclusion in the analysis based on relevant maternal characteristics and other potential risk factors for postpartum relapse reported in the current research literature. SPSS for Windows (version 21) was used for the analysis. Missing data were replaced via expectation-maximization (EM) imputation. Logistic regression was used to identify meaningful predictors of postpartum relapse to smoking.

2.2.4 Results

Characteristics of the 145 women who were included in this study are shown in Table 8. The sample was mainly white (79.8%), first-time mothers (51.6%), and infants born at full-term (92.2%). Over half of the sample had 13 or more years of education. Approximately 50% reported an unplanned pregnancy and one in four never attempted to breastfeed their newborn.

Table 8 Sample Characteristics (% , N=145)

Race	
White	79.8
Black	13.2
Other	6.9
Age	
24 years or younger	41.4
25-29 years	31.0
30-34 years	17.2
35 years or older	10.4
Education	
11 years or less	15.2
12 years	26.1
13-15 years	37.0
16 years or more	21.8
Marital status	
Married	43.4
Other	56.6
Total income during the year before pregnancy	
< \$20,000	35.5
\$20,000 - \$50,000	33.4
> \$50,000	31.1
WIC services used during pregnancy	
No	50.9
Yes	49.1
Previous live birth(s)	
0	51.6
1	29.5
2	13.7
≥ 3	5.2
Intentions related to pregnancy	
Planned	34.8
Planned and desired sooner	13.9
Unplanned	51.2
Gestation length	
≤ 33 weeks	2.7
34-36 weeks	5.1
≥ 37 weeks	92.2
Breastfeeding duration	
None	26.1
0-6 weeks	34.5
7-26 weeks	14.2
Now	25.2

Approximately 45% of women in this sample reported returning to smoking within the first six months after the birth of their child. Results of the variables examined as predictors of relapse and potential interactions between factors are shown in Table 9. The only factor that was found to be a significant predictor of postpartum relapse to smoking was breastfeeding status. For women responding “none” for breastfeeding, the chance of postpartum relapse to smoking was 3.3 times higher than women responding “now” for breastfeeding status ($p = .038$, $OR = 3.3$). For women responding breastfeeding sometime between “7-26 weeks” their chance of postpartum relapse to smoking was 6.0 times higher than women responding “now” for breastfeeding status ($p = .007$, $OR = 6.0$).

Table 9 Variables and Interactions examined as Predictors in the Analysis

Variables with no significant relationship to postpartum relapse to smoking
WIC used during pregnancy
Years of maternal education
Total income before pregnancy
Previous history or treatment for depression
Maternal body mass index
Previous live births
Timing for start of prenatal care
Adequacy of prenatal care (Kessner Index)
Prenatal education about breastfeeding
Prenatal education about depression
Interactions explored but no significant relationship to postpartum relapse to smoking
Marital status
Maternal race
Payment type for prenatal care
Maternal age
Prenatal education about smoking
Intention or planning for pregnancy
Total number of stressors
Postpartum feeling of hopelessness

2.2.5 Discussion and Implications

The goal of this study was to identify significant predictors of postpartum relapse to smoking using an available dataset from residents of Pennsylvania. Smoking three months before pregnancy and abstinence during the entire pregnancy (zero cigarettes smoked during pregnancy) was required to be selected for analysis. Our study concluded there was a 45% relapse rate for 2011. Other researchers may identify potential relapse candidates as women reporting any smoking during the last three months before pregnancy and no smoking during the last three months of pregnancy. Using this definition, postpartum relapse rates for Pennsylvania covering 2007 through 2011 were calculated at 59.6%, 51.2%, 47.7%, 50.2%, and 41.8%, respectively (Rockhill et al., 2016) For women in Pennsylvania, postpartum relapse rates have shown an encouraging downward trend over this five-year time period.

Contrary to results from research in the literature, our study of 145 women found only a connection between breastfeeding status and postpartum smoking status. Initiation of breastfeeding and length of breastfeeding have repeatedly been connected with maintained smoking abstinence in the postpartum period (Colman & Joyce, 2003; Martin et al., 2008). For the current study, women who never initiated breastfeeding were over three times more likely to return to tobacco use in the postpartum period than women who were still breastfeeding when they completed the survey. An unusual finding from this study involved women who breastfed between 7-26 weeks. These women were six times more likely to return to smoking than women who were still breastfeeding when they completed the survey. Since women answer the questions independently, perhaps some confusion existed about the questions and responses within the PRAMS survey inquiring about breastfeeding status leading to this contradictory result. This unexpected finding warrants further study.

The PRAMS dataset is a reliable and standardized source of information covering women's tobacco use before, during, and after pregnancy. The questions are delivered in a nonjudgmental manner and answered directly and anonymously by the women themselves. A majority of states participate in the monitoring system and a process exists to request single-state or multi-state datasets. Targeted analyses of these annual datasets have the potential to identify geographic differences and changes in patterns over time as well as insight into this complex phenomenon of postpartum abstinence versus relapse to smoking.

This project was an exploration of possible predictors of relapse for 145 women. Because of the relatively small sample size, the study may not have been powered to detect additional factors associated with smoking relapse. Larger samples are required to identify consistent predictors of postpartum relapse to smoking. A primary goal of prenatal care is maternal education regarding important aspects of health to promote better maternal and newborn outcomes. An awareness of the multitude of potential variables associated with a return to smoking will assist maternal-child healthcare providers to explore which factors may have particular relevance to individual women in order to personalize relapse prevention activities. Ongoing analysis of the PRAMS data may assist in our understanding of this complex phenomenon.

2.2.6 Acknowledgements

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3.0 Methods

This chapter reviews the methods as they were presented and approved during my Comprehensive Exam and Overview (CE & O) on December 16, 2014. Since the CE & O, with the approval of my dissertation committee, modifications were made to the proposed methods for my dissertation study. These modifications are described in 3.15 Summary of Study.

3.1 Purpose

The purpose of this study is to describe the dominant psychosocial process of abstaining from smoking and preventing relapse to smoking in the postpartum period according to the stages of the transition to motherhood, including identification of the facilitators and barriers to continued smoking abstinence and potential strategies to aide in smoking abstinence and relapse prevention.

3.2 Design

The grounded theory method was selected for this study because it allows for the generation of a substantive theory to explain psychosocial processes based on the experiences of individuals situated in the phenomenon of interest (Glaser & Strauss, 1967). The method is based on a constructivist philosophy, the quest to understand our surroundings and find meaning in an experience (Lincoln et al., 2011)]; the emerging theory is “grounded in the data” (Charmaz, 2000, 2006). When little is known about a topic, such as successful prevention of postpartum relapse to

smoking, the grounded theory approach enables the researcher to provide an "explanation of the process" (Birks & Mills, 2011). This approach allows one to recognize that preventing relapse to smoking occurs within the process of becoming a mother, yet rich and vivid accounts of the facilitators and barriers women face during this time of transition have yet to be described.

3.3 Data Sources

Two sources of qualitative data will be collected face-to-face with postpartum women. First, focus groups will be conducted to provide a range of perspectives and underlying context for postpartum smoking decision-making, and then semi-structured follow-up interviews will be conducted with selected individuals to add depth and detail to specific concepts and relationships gleaned from the focus group discussions to further explain the experience. When combined, the strengths of each of these methods balance the inherent weaknesses within each individual approach. The aim is to gain a deeper understanding of the commonalities and differences within the process of abstaining from smoking and preventing relapse to smoking in the postpartum period according to the stages of the transition to motherhood. To maximize the benefits of these data sources, I have sought opportunities for guided study in facilitating focus groups, conducting interviews, and analyzing qualitative data.

3.3.1 Focus Groups

Focus group methods provide both exploratory and explanatory power. Questions are raised in a group setting to prompt discussion and gain a rich understanding of the individuals'

perspectives to achieve a fuller exploration of the phenomenon of interest. Focus group discussions succeed in part because participants are selected based on common characteristics within the phenomenon of interest. To enhance discussion of the common experiences and based on acknowledgement that the experiences of women who were able to abstain from smoking after delivery may be different from women who have relapsed, the focus groups will be stratified based on current smoking status (abstinence versus relapse). Focus group participants realize they are talking to others who can relate to their situation, thus prompting a level of free expression and sharing of experiences that provide depth and diversity (Hennink, 2014).

The strength of focus groups lies in the ability to assemble informants who share a common experience and the opportunity to hear the diversity of perspectives and detail in context to be gathered during the discussion (Hennink, 2014). Participation in a focus group is known to empower members to speak openly to their peers about the circumstances in their personal lives. The success of a focus group in revealing the diverse perspectives depends on the ability of the moderator to create a non-threatening environment, limit her own voice to encourage greater sharing by individuals, facilitate the group dynamics by moderating dominant voices, encourage expression by more hesitant participants, and clarify misleading or untruthful information as necessary (Hennink, 2014).

Several weaknesses are possible when focus groups are conducted. The quality of the data obtained from the discussion will be affected by the skill of the moderator leading the group as described above. Another potential weakness attributed to reliance on focus group techniques is the potential to have difficulty with generalizability of the results from the study sample to a larger population (Hennink, 2014). While qualitative research is not conducted to generalize results to a larger population, a thorough exploration of various viewpoints for the phenomenon of interest

allows for the representativeness of the results to a specific population to be considered. Women located at many different time points along the first postpartum year, whether abstinent or relapsed, will be sampled for this study. Diversity in postpartum experience, based on differences in sociodemographic characteristics, will be explored if possible, during analysis.

3.3.2 Semi-Structured Interviews

Face-to-face interviews build on the development of rapport between interviewer and interviewee. Individual interviews allow for a deeper exploration of particular aspects of the phenomenon of interest. Follow-up can focus on what this particular person has said about the topic of interest; the individual perspective is thoroughly examined.

Many strengths of collecting data by interview are apparent when researching postpartum smoking behavior. Accuracy in the description of abstinence or relapse is improved; the individual perspective and minutiae of detail may be explored in-depth. Fear of group disapproval is removed as a concern during an interview and mothers who may have been hesitant about self-disclosure within the focus group setting may talk freely in a one-on-one setting.

Weaknesses of face-to-face interviews may also occur when exploring postpartum smoking behavior. While the interviewer will pose the questions, there is only one participant able to provide a response; answering a question is a voluntary choice on the part of the interviewee. Because there are no other participants familiar with the research topic listening to the interviewee's responses, inaccurate data (embellished or superficial descriptions) may become part of the analysis process.

3.4 Setting

Participants for this study will be recruited from maternal-child healthcare offices and supportive services available to the women of Allegheny County.

3.5 Sample

To be eligible for the study, inclusion criteria include the following: 1) postpartum women within 12 months of delivery, 2) at least 18 years of age, 3) history of smoking prior to pregnancy, 4) self-reported cessation of smoking during pregnancy and 5) English-speaking (all qualitative interactions will be conducted in English). Exclusion criteria include the following: 1) current pregnancy (hormonal changes during gestation may be advantageous to smoking cessation) and 2) newborn or infant death within the past year (grieving process may affect decisions regarding tobacco use).

3.6 Sampling

Several types of sampling will be employed to achieve the study aims. **Criterion sampling** will be used to identify a diverse pool of women who meet eligibility criteria. **Purposive sampling** (Miles et al., 2014) will be used to consciously select women from the eligible pool with various characteristics that are thought to represent the sample of interest and influence smoking in the perinatal period, such as parity, age, and age of newborn. Based on concepts and relationships

discovered during the data analysis of the first two focus groups, **Theoretical sampling** (Miles et al., 2014) will be used to guide the selection of women for each of the second focus groups and to participation in one-to-one interviews, based on their ability to provide additional insight about the phenomenon.

Sample size considerations indicate a total of four focus groups (two with women maintaining abstinence and two with women who have relapsed to smoking), comprised of 4-8 women per group, is planned. When exploring a sensitive topic, the ideal size for the focus group is 4-8 people. This number allows for diversity in the participants, hopefully they will recognize “someone like themselves” which may stimulate or encourage discussion; while limiting any potential strain on the moderator trying to follow and guide the discussion (Liamputtong, 2011). The focus groups will yield a sample of approximately 24 women, from which approximately 10 will be selected for follow-up interviews. While identification of the needed number of focus groups cannot be accurately estimated before data collection and initial data analysis have started, 3-5 sessions is suggested for each variable (Liamputtong, 2011). Theoretical sampling strategies can aid in constructing diverse focus groups able to knowledgeably speak to the topic of interest. Deciding on the number of follow-up interviews will also be guided by the initial results of data analysis. Postpartum smoking decision-making is a complex phenomenon. With increasing complexity, an increase in interview number above 10 may become too data-heavy for analysis while less than 5 interviews may leave the topic too sparsely described for useful analysis (Miles et al., 2014).

3.7 Recruitment

I have access to the recruitment sites as an experienced maternal-child healthcare provider in Allegheny County and as a clinical obstetrical nursing instructor. I will meet with personnel from healthcare offices and representatives of various community organizations within Allegheny County to explain the study and promote recruitment activities. A flyer describing the purpose of the study and instructions for contacting the researcher will be distributed in appropriate locations. I will be the point-of-contact for all potential participants. When contacted by a potential participant, I will explain the purpose and structure of the study and screen the mother for eligibility based on the inclusion and exclusion criteria. Verbal consent will be obtained in order to collect basic eligibility information and to allow future contact if the woman is selected for participation in the focus group. Each woman will be asked to provide her name, contact information, time since delivery, and current smoking status. Enrollment for the focus groups will continue using purposive sampling and theoretical sampling until 4-8 women who possess the desired characteristics have been recruited for each group. Recruitment of women for the follow-up interviews will continue using theoretical sampling until approximately 5-15 women are interviewed and saturation is reached. Saturation occurs when nothing new is uncovered with further data collection; whatever is “gleaned” during analysis is not expanding or adding to the description of the phenomenon of interest (Charmaz, 2014).

Incentives will be given at the end of each focus group and interview to compensate for the woman’s time and appreciation for her participation. Participants will be given a choice between a package of diapers, clothing, voucher for parking, or an age-appropriate toy for their child; total worth for each option will be approximately \$10.

3.8 Data Collection

Focus groups will be the main source of data for this study; follow-up interviews with selected focus group participants will be used to provide greater depth and detail on particular aspects of the phenomenon of postpartum relapse to smoking. A tentative script of questions to guide the focus group discussions is under development. The script is semi-structured in order to gain information on targeted topics, be flexible enough to allow the conversation to be guided by the participants, and allow the moderator to add follow-up questions to explore any answer in greater detail (Brinkmann, 2013). The script includes an introductory statement, 6-8 questions, and a closing statement. The formal (research) language of the research purpose, central research question, and theoretical questions will be operationalized into the informal (participant) language (Wengraf, 2001). The focus group sessions will be audio recorded to facilitate analysis of the discussion and capture direct quotations for possible future reports (Liamputtong, 2011). The semi-structured script for the individual interviews will be constructed after analysis of the focus group data to gather greater detail on experiences shared during the focus group discussions.

As moderator of the focus group, I will pose questions for discussion to the group and assess the flow of dialogue, intervening if appropriate to lessen the impact of dominating voices and enhance the participation of quieter participants (Liamputtong, 2011). Immediately after the focus group session, I will make field notes about the discussion, use of body language, eye contact, and my early reflections of the thoughts expressed during the session.

An assistant (field note-taker) will attend the focus group sessions. This assistant is a senior-level, undergraduate student in the School of Nursing and my mentee in the University Research Mentorship Program. She will be responsible for the audio recording equipment during the sessions. In addition, she will address any issues regarding the room or questions from

individual women that may arise. She will not be a part of the focus group discussion and will not sit with myself or the participants. She will maintain a seat in the background but will be able to quietly document the non-verbal behavior of the participants during the session (Liamputtong, 2011). If the assistant is not available, I will assume her duties regarding care of the audio recording equipment and assisting the participants.

The focus group will last 1-1.5 hours as tolerated. Breaks will be provided if necessary and water will be available. The location of each focus group will vary based on ease of access, convenience, comfort, and needs of the participants. The potential for childcare services during the focus group sessions may be facilitated by help from additional senior-level, undergraduate students in the School of Nursing. Potential meeting locations include space in the School of Nursing or community spaces.

3.9 Data Analysis

Participant characteristics will be summarized to describe the sample. The audio recordings from all focus groups and individual interviews will be professionally transcribed. The accuracy of each transcript will be established by comparison to the original audio version. Field notes and memos created during the study will be converted to Word documents to aid the analysis process.

After the first abstinent and relapse focus groups are conducted and transcribed, initial data analysis will begin. The process of coding entails identifying emerging “themes” or “similarities” in experience being expressed by the participants (Birks & Mills, 2011). During constructivist ground theory analysis, Charmaz (Charmaz, 2014) advocates for the use of gerunds as codes. This

specific wording for each code reinforces grounded theory is used for the exploration of a process and keeps the focus on the participant experience. **Initial coding** allows for deconstruction of the data: concepts are “named”, patterns are “identified”, and data are “compared” across participants. An initial conceptualization of the phenomenon of interest is being developed and any necessary adjustments to the focus group guide will be made to facilitate meaningful data collection.

Constant comparative analysis will be ongoing during the iterative steps of data collection and data analysis (Charmaz, 2006). Comparison among all voices revealed in the data is an important mechanism that moves the research activities from description of a phenomenon to explanation of the phenomenon. Individual coding activities by me will be supplemented with, and challenged by, group coding work with my advisor and other committee members as needed. Formalization of defined codes will be an important step in the analysis process.

To gain additional knowledge of specific concepts and relationships discovered during the initial coding exercises, theoretical sampling (Miles et al., 2014) will be used to guide the selection of participants from the open enrollment pool of postpartum women for the second round of focus groups; in other words insights gleaned from women in the first abstinent focus group will be used to guide selection of women for the second abstinent group; the same process will be used for the selection of women for the second relapse focus group.

After initial analysis of all four focus groups, **theoretical sampling** will be used to select 5-15 individuals to participate in one-to-one interviews based on their ability to provide additional insight into postpartum smoking relapse or abstinence. The data from these follow-up interviews will be added to the data from the focus groups and intermediate coding activities will begin. Defined as **focused coding**, connections between codes will be rearranged and redefined, allowing

for the emergence of categories and eventually patterns explaining the process of interest (Miles et al., 2014).

After **saturation** has occurred, as evidenced by the lack of new insights into postpartum smoking decision-making, formalization of established concepts and relationships within the process of interest will proceed. From the entire volume of data collected for this study (demographic data, transcripts, and memos), advanced coding, in the form of **theoretical coding**, will lead to **theoretical integration** and the **construction of a substantive theory** describing the psychosocial process of abstaining from smoking and preventing relapse to smoking in the postpartum period (Birks & Mills, 2011).

3.10 Data Management

During open enrollment, participant contact information will be stored on a password-protected, encrypted, user-restricted computer file. If selected for study participation, actual names will only be located on the informed consent documents signed at the beginning of each focus group session. These documents will be kept in a locked desk drawer within a locked room in the PhD student area. No personal identifiers will be disclosed in the transcripts of the focus groups or interviews.

Two audio recordings for all study interactions will be maintained to ensure quality data collection. Equipment will be inspected prior to each usage and replacement batteries will be available. All audio recordings will be maintained on a flash drive and stored in a locked desk drawer in the PhD student area for a minimum of 5 years.

Management of data transcripts and analysis activities will be aided by the Atlas.TI software program. Additional computer files (including audio recordings and memos) will be stored with Atlas.TI files in a password-protected, encrypted, user-restricted computer file.

3.11 Researcher as Instrument

Prior to beginning a study, a researcher must clarify her personal philosophical assumptions. This is particularly important for this qualitative inquiry where I, the researcher, serve as instrument (Creswell, 2013). I will be collecting data, both verbal and non-verbal, generated from instruments (guides) I created. Consistent with social constructivism, my ontological belief is in multiple realities. Epistemologically, I believe each reality is shaped by the individual's experiences. I believe that in every encounter with individuals, their personal values should be acknowledged and honored (axiological belief). In regard to my personal choice for methodology, I believe the naturalistic approach to inquiry is especially useful for uncovering the nuances of a particular process or phenomenon (Creswell, 2013) such as the psychosocial process of abstaining from smoking and preventing relapse to smoking in the postpartum period.

In grounded theory, the role of the researcher as a facilitator, interviewer, and interpreter of data are paramount for focus groups and interviews to be fruitful sources of data. The ability to build rapport is an important skill for a qualitative researcher. A woman can experience a multitude of emotions and experiences as she transitions from a pregnant woman to a new mother. Familiarity with this transition will help me to establish rapport with potential research interviewees and initiate meaningful, insightful dialogue.

3.12 Rigor and Trustworthiness

Trustworthy (deserving of trust or worthy of confidence) and the state of trustworthiness, is the conceptual foundation for the “validation” of “good” qualitative research. Trustworthiness is the term used to refer to the steps undertaken during the research process to promote rigor in qualitative inquiry (Tuckett, 2005). Several different sets of standards have been advanced in the qualitative tradition, particularly during the 1980’s. For this study, the concepts of credibility, transferability, dependability, and conformability will be employed (Lincoln & Guba, 1985). Each rigor criteria have specific strategies and techniques to be followed during the research process.

Credibility will be established during several stages of the research process (Tuckett, 2005). I will select women with first-hand knowledge of postpartum smoking decision-making and will record all participant interactions to enhance the analysis process through the creation of transcripts. In addition, I will keep a field journal throughout the study and document my personal observations (memoing) after each qualitative interaction, as well as my decision-making process (audit trail) during all analysis stages. Purposive and theoretical sampling will allow me to explore atypical and diverse perspectives related to postpartum smoking abstinence and relapse. Throughout data collection and analysis, I will seek guidance from my advisor and other committee members, in order to engage in constant comparative analysis. I will be able to develop a prolonged engagement with those women participating in both the focus group and individual interview. The use of two rounds of focus groups will also allow me to explore comments from one group within the discussion of a later group (member checking).

Transferability will be rooted in the women I sample for the study and the descriptions elicited from these women during the qualitative interactions (Tuckett, 2005). Purposive and

theoretical sampling procedures will allow me to explore the diverse perspectives of postpartum women who remained abstinent versus relapsed. The use of probing questions, during both focus groups and individual interviews, will prompt women to provide a thick description of their personal experiences. This richness of detail will be displayed by the quotations selected for inclusion on any reports of this study.

Dependability in the outcome of a qualitative inquiry may be supported during various stages of research (Tuckett, 2005). Once again, precise handling of all data and attention to the steps of the research project are paramount. Consistent recording of all participant interactions and detailed descriptions of my decision-making will support the conclusions reached and the theory generated from this project. I will use all available data sources (transcripts, demographic data, note-taker observations, and personal memos) to inform my development of a substantive theory describing the psychosocial process of abstaining from smoking and preventing relapse to smoking in the postpartum period. This process of triangulation will be reviewed with my advisor and other committee members as appropriate; this peer review will assist me in the development of my findings “rooted in the experiences of the participants”.

Confirmability of the findings of my research will be linked to my meticulous application of the proposed methods. Methodological congruence will be represented by a seamless flow in the research design from my philosophical assumptions to my research aims to the study’s planned approach. Transparency in the research process will be established through my documentation of all personal decision-making activities (audit trail).

3.13 Study Limitation

A truthful representation of smoking status for each participant is a crucial component of any study looking at relapse. Using self-report for smoking status will entail navigating two potential sources of bias – social desirability bias (tilting smoking status to negative to “please” the researcher) and social norm bias (tilting smoking status to positive to “fit in” with the community). There is a long history of studies looking at the use of self-report for smoking status in a pregnant population; both positive and negative results can be found.

3.14 Research Participation Risks and Protections

3.14.1 Risk to Human Subjects: Focus Group and Potential Interview

Approximately 24 women, with a history of smoking before pregnancy and abstinence during pregnancy, will be enrolled while in the twelve months encompassing the postpartum period. Literature describing the study will be located at various maternal-child healthcare offices and supportive services within Allegheny County and encourage participation from women who remain abstinent and women who have relapsed. Potential participants will be provided further information on the study and verbal consent will be obtained to allow scheduling of the stratified focus groups (abstinence versus relapse). At the start of each focus group the women will provide anonymous personal demographic data and informed consent for audio-recording of the session and possible future contact if needed will be collected. During transcription of the focus groups, any references to personal identifiers will be removed. If a follow-up interview is conducted with

individual participants, that transcript will also be devoid of personal identifiers. Only I will have access to the names of potential and actual participants. Risks of participation in this study are minimal and center on the topic and method of the study. Some women may become uncomfortable while discussing their history of tobacco use. Being involved in a group discussion format may be intimidating for some women. The use of audio recording during all participant encounters may be perceived as an invasion of privacy by some women.

3.14.2 Adequacy of Protection Against Risks

Participant privacy and confidentiality will be protected by several measures. Actual names will not be used on the personal demographic data form. Any signs of participant discomfort or distress during data collection will be addressed immediately. The note-taker (a fourth-year nursing student) will be available at every focus group and able to talk privately with any woman upset during the discussion. An opportunity for a debriefing session with me will be offered after every data collection session. I will also have a list of available community support people if any participant desires this information due to distress or discomfort from the focus group discussion. Potentially identifying information will be modified as needed when the study findings are reported. Contact information for the participants will be kept in a password-protected, encrypted, user-restricted computer file. All other study materials including the demographic forms, audio recordings, and transcripts, will be kept in a locked drawer (accessible only to me) within a locked room (the PhD student office area). Audio recordings will be stored for a minimum of 5 years.

3.14.3 Potential Benefits of the Proposed Research

There are no known direct benefits to the women while participating in the study. Indirectly, some women may derive a positive experience talking about their own story and hearing from other women who have the same background. The minimal acknowledged risks to participants are outweighed by the potential benefit of learning more about the phenomenon of postpartum relapse to smoking.

3.14.4 Importance of the Knowledge to be Gained

The lack of long-term success in preventing postpartum relapse to smoking indicates there is much yet to uncover concerning this phenomenon. This qualitative study has the potential to add to the body of knowledge regarding relapse prevention. The potential for scientific advancement will counterbalance the possible participant risks of discomfort during data collection or breach of confidentiality during data analysis or data reporting.

3.14.5 Data and Safety Monitoring Plan

This is not a clinical trial, so a Data Safety Monitoring Board is not needed. Throughout the study I will meet regularly with the chair, and as needed with the other committee members, to review any pertinent issues dealing with data collection or data analysis. As indicated, changes to the study's methodology will be instituted in line with the principles of grounded theory. Participant safety issues and the ongoing progress of the entire study is my responsibility.

3.14.6 Inclusion of Women and Minorities

This is a study of tobacco-related behavior in postpartum women. Therefore, only women will be enrolled in this study. Postpartum return to smoking behavior is a phenomenon found across all ethnicities and races; no woman will be excluded from this study based on ethnicity or race.

3.14.7 Inclusion of Children

No woman under the age of 18 will be enrolled for this study. Beyond the differences in development and maturity for teenagers versus adult women, no one under the age of 18 is legally able to purchase tobacco products in the US.

3.14.8 Ethnicity and Racial Composition

Based on data from 2013, the racial composition of Allegheny County (setting for participant recruitment) was 81.3% White, 13.3% Black or African American, and 3.2% Asian. Based on Census Bureau data, approximately 1.8% of the population in Allegheny County identify themselves as Hispanic or Latino. Recognition of this racial distribution will be maintained during the study, but the needs of purposeful and theoretical sampling will guide participant enrollment activities.

3.15 Summary of Study

The primary method for data collection for the dissertation study was changed from focus groups to individual interviews. All interviews were conducted via telephone to meet the scheduling demands of the participants and minimize any impact on their offspring. Recruitment strategies still included flyers posted in local maternal-child healthcare facilities and electronic advertisements posted throughout Pennsylvania. The scope of distribution for the flyers was expanded to the eastern part of Pennsylvania and information was also sent to local community-based supportive service agencies. Adjustments were made to the plan for qualitative analysis once the challenge of recruiting within the postpartum population was recognized. I used qualitative description to analyze the data rather than grounded theory as originally proposed. This change was needed to ensure the selected analysis method was appropriate for the volume of collected research findings. The final sample size was six. The participants reflected diversity in multiple characteristics, including maternal age, time since the birth, parity, and presence or absence of support with parenting. All committee members were aware and agreed to the proposed modifications. Institutional Review Board approval (PRO15020049) was obtained from the University of Pittsburgh and Institutional Review Board review was obtained from York College of Pennsylvania. A comprehensive explanation of the methods for this study are described in the manuscript *Smoking Abstinence and Relapse in the Context of Transitioning to Motherhood* in 4.0 Findings.

4.0 Findings

Study findings are presented in the format of the final manuscript (*Smoking Abstinence and Relapse in the Context of Transitioning to Motherhood*, S.E. Bare, S.A. Albrecht, B. Braxter, M.D. Levine, and A. DeVito Dabbs, manuscript in preparation), to be submitted for publication after defense.

4.1 Background

Evidence connecting tobacco use during pregnancy with significant fetal and neonatal impact is well established (Blood-Siegfried & Rende, 2010; Cornelius & Day, 2009; Shah et al., 2006; Shinohara & Matsumoto, 2017). Yet, a 2020 study reported an 11% rate of cigarette use among women 18 years of age or older in the United States (Cornelius, 2022). Smoking rates specific to the childbearing cycle for 2016-2020 included 14-17.7% during the three months prior to pregnancy, 6.5-7.7% during the last three months of pregnancy, and 8.8-11.7% in the postpartum period (Division of Reproductive Health, 2022). Data collected of all U.S. births in 2014 revealed smoking rates during pregnancy ranging from 1.8% in California to 27.1% in West Virginia (Curtin & Matthews, 2016).

Healthy People 2030 has established objectives focusing on pregnancy and tobacco use (Office of Disease Prevention and Health Promotion, 2022). Two objectives specifically address tobacco use and the childbearing cycle: to increase abstinence during pregnancy and increase successful quit attempts during pregnancy. The structured framework of healthcare available

during the antepartum period helps to support cessation efforts during pregnancy (American College of Obstetricians and Gynecologists, 2017). Physiologic changes of pregnancy may also support cessation efforts through the development of sensory aversions to the act of smoking (Pletsch et al., 2008).

Multiple studies over the past two decades demonstrate that successful cessation during pregnancy is not consistently sustained into the postpartum period (Jones et al., 2016). Nationwide studies of smoking relapse rates as high as 40-50% have been reported during the first several months after delivery (Colman & Joyce, 2003; Rockhill et al., 2016; Tran et al., 2013). Within the context of the childbearing cycle, motivation for cessation during pregnancy for the health of the fetus is well supported, but motivations for continued abstinence diminish in the postpartum (Constantine et al., 2014). Differences in the characteristics of those who quit smoking during pregnancy and those who relapse in the postpartum have been identified across many studies (Kia et al., 2018; Shisler et al., 2015). Unfortunately, some of these characteristics such as age, marital status, and partner smoking status appear to contribute to both abstinence and relapse in any given peripartum situation.

Maintaining abstinence from smoking during pregnancy and beyond involves a long-term change in behavior. A systematic review of behavior change techniques targeting postpartum smoking relapse prevention found some promising interventions such as problem solving, information about health consequences, and social support (Brown et al., 2019). The authors surmised that interventions should be tailored to the individual to increase the chance of maintaining smoking abstinence in the postpartum period.

The postpartum period is a time of incredible growth and change for the woman, newborn, and the resulting family. The theory of “Becoming a Mother” (Mercer, 2004) seeks to describe the

development and advancement of a woman's persona as motherhood is achieved. Successful evolution of the maternal identity progresses across four stages, beginning in pregnancy and continuing into the postpartum period. During pregnancy, the woman is committing to the fetus and preparing for the newborn. Following the birth, the woman is healing physically and learning to care for her offspring. Once this initial acquaintance period passes, the woman is searching for a new normal by adjusting relationships with partner, family, and friends to include the newborn. When the woman feels comfortable and competent in her caring skills, having expanded her idea of self to include all her relationships within the family, the maternal identity is achieved (Mercer, 2004). While these stages are described as a process, the length of time spent in each stage is variable, and movement through the stages is not unidirectional. Maternal and infant characteristics, as well as the social environment of the developing family, all play a role in the transition to becoming a mother (Mercer, 2004). If smoking relapse prevention strategies should be tailored to the individual, recognition of the transformative process of becoming a mother may be important but to date, has not been the focus of exploration of smoking in the perinatal period. The overall goal of this dissertation qualitative study was to explore the process of abstaining from smoking during pregnancy and preventing postpartum relapse to smoking in the context of transitioning to motherhood.

4.2 Methods

4.2.1 Design

Qualitative description was used to gain a better understanding of the decision-making process regarding smoking in the perinatal period through the words of postpartum women with a history of tobacco use during pregnancy. The choice of qualitative description allowed for a comprehensive summary of the participants' experiences using their words, their "voices" (Sandelowski, 2000). Qualitative description provided an opportunity to obtain frank details about postpartum smoking relapse and abstinence directly from women experiencing this situation. The study was approved by the Human Subject Protection Office of the University of Pittsburgh (PRO15020049 / CR20070224-003) and York College of Pennsylvania.

4.2.2 Sample

Participants were recruited from several counties across the Commonwealth of Pennsylvania. An explanatory letter and study flyers were posted via eMessage Boards within the Pediatric PittNet system and at the Outpatient Clinic at Magee-Womens Hospital of UPMC, at maternal and pediatric healthcare offices, and across community-based support organizations for childbearing families. Inclusion criteria included age 18 years or older, childbirth within the past 24 months, history of tobacco use prior to pregnancy, and self-reported smoking cessation during pregnancy. Exclusion criteria included current pregnancy or loss of a child within the past 12 months. Purposive sampling (Miles et al., 2014) was used to recruit all six participants interested in the study, intentionally including women representing a diverse spectrum of maternal age,

parity, and breastfeeding status as these characteristics were thought to be influential on postpartum smoking relapse and abstinence.

Women interested in the study contacted S.B (a nurse with 20-years of experience in maternal-child healthcare), either via phone or email. A scripted screening procedure was followed to determine eligibility of each participant. Contact information was collected from women who were interested in enrolling in the study. Interviews were conducted immediately after the screening, or later, depending on the woman's schedule. S.B. conducted all interviews while employed as full-time faculty in the nursing department at York College of Pennsylvania. Her private work office served as a base for research activities.

4.2.3 Data collection

Interviews were conducted with women transitioning to motherhood to identify the facilitators and barriers to smoking cessation during pregnancy and continued smoking abstinence in the postpartum, as well as any strategies used to prevent relapse. A standardized protocol was developed to explain all study activities, answer questions, review the risks, benefits, and compensation for completing an interview, and document verbal consent before proceeding with the interview. A semi-structured interview guide (Table 10) was used to pose questions and follow-up probes regarding self-reported smoking and abstinence activities throughout the perinatal period. Each interview was conducted by S.B. via telephone, lasted approximately 30-45 minutes, was audio-recorded, and transcribed verbatim. During the interview, women were asked to describe their use of tobacco before, during, and after the birth of their child. They were also asked to describe any actions they took to avoid smoking, as well as times during the postpartum period when self-reported relapse was harder or easier to avoid. The women were asked to explore the

impact of the transition to motherhood on their decision-making regarding tobacco use such as the influence of the growth of the baby and the emerging dynamics of the newly formed family. Following each interview S.B. wrote memos to document thoughts about the conversations, such as tempo, any interruptions, and the woman’s responsiveness. No follow-up contact with interviewees was required and transcripts were not shared with participants.

Table 10 Semi-Structured Interview Guide and Follow-up Probes

<p>Q. Tell me briefly about your smoking activity during pregnancy and since experiencing motherhood.</p> <ul style="list-style-type: none"> • How would you describe your smoking behavior during pregnancy? • Did you have any plan to stop smoking during pregnancy? • Did you tell anyone about your plan?
<p>Q. Did you think about what you would do about smoking after the delivery?</p> <ul style="list-style-type: none"> • Did you formulate a plan?
<p>Q. What has it been like trying to not smoke and having a new baby at home?</p> <ul style="list-style-type: none"> • Has anything helped your plans to remain abstinent? • Has anything gotten in the way of remaining abstinent?
<p>Q. Would you pinpoint particular times since childbirth that have made it really easy to avoid smoking?</p> <ul style="list-style-type: none"> • What do you think was special about these times?
<p>Q. Would you pinpoint particular times since childbirth that have made it really hard to avoid smoking?</p> <ul style="list-style-type: none"> • What do you think was special about these times?
<p>Q. Tell me about some of your actions to prevent going back to smoking.</p> <ul style="list-style-type: none"> • Success or failure? • Any “tricks” to prevent smoking? • Any use of technology to prevent smoking? (websites, apps, distraction)
<p>Q. Would you describe how your baby’s age fits into any decision about smoking?</p>
<p>Q. Would you describe how tobacco use (smoking) fits into the family today?</p> <ul style="list-style-type: none"> • How would you describe your smoking behavior since delivery?

4.2.4 Data analysis

Each transcribed interview was reviewed for accuracy. Transcripts and memos were uploaded to Microsoft® Word (version 2210, Microsoft 365) for analysis. S.B. performed initial coding of each transcript, naming concepts and identifying patterns, defining themes with corresponding evidence and creating a codebook (Miles et al., 2014). Constant comparative analysis, an iterative process of revising themes by comparing codes across all interviews (Glaser & Strauss, 1967), was used to identify participants' significant statements and patterns to incorporate into the final codebook. The coding for each interview was reviewed by a second coder (ADD). Any coding disagreements were resolved through discussion until achieving consensus. An audit trail was maintained to document decisions for each round of analysis (Creswell, 2013). Recruitment activities ceased as data saturation was reached i.e., the point when new data was redundant with data already collected (Miles et al., 2014). The final version of the codebook, as well as participant demographic characteristics, smoking status patterns, and memos, were reviewed and connections between themes were identified. This focused coding led to the clustering of themes into final categories (Miles et al., 2014) that were supported by exemplar quotes.

Steps were taken to ensure the trustworthiness and rigor of the study based on established criteria for qualitative studies (Lincoln & Guba, 1985). Credibility, providing supporting evidence that the findings accurately represent what was studied, was met by including direct quotations, the use of constant comparative analysis, and achievement of data redundancy. Transferability, providing detailed contextual information such that readers can determine whether the results are applicable to certain situations, was met by providing participant characteristics and patterns of their experience with smoking in the context of the theory of "Becoming a Mother" (Mercer,

2004). Confirmability, ensuring and communicating to the reader that the findings are based on and reflective of the information gathered from the participants and not the interpretations or bias of the researcher, was met through the consistent use of a semi-structured discussion guide, and consensus between coders (Lincoln & Guba, 1985). Dependability, describing the study process in sufficient detail that the work can be replicated, was met through the iterative development of the codebook and maintenance of an audit trail of all analysis decisions. See Appendix D for the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist: A 32-item checklist for interviews and focus groups (Tong et al., 2007).

4.3 Findings

4.3.1 Participant Characteristics

Six women met the eligibility criteria and completed a telephone interview. Most of the participants were white and in the 26-34 age range (Table 11). The sample was equally divided on parity status and five women reported breastfeeding in the postpartum period. Most of the women reported a minimum of 10 cigarettes smoked per day prior to pregnancy and half of the women were exposed to second-hand smoke in the home during the pregnancy.

Table 11 Sample characteristics at the time of the interview (N=6)

Characteristics	Number	Percent
Age group in years		
18 to 25	1	16.7
26 to 34	4	66.7
35 to 45	1	16.7
Highest level of education		
Grade school / some high school	1	16.7
HS diploma / GED diploma	1	16.7
Some college / technical school / 2-year degree	3	50
4-year degree	1	16.7
Race		
Black or African American	1	16.7
White	5	83.3
Age of child in months		
0 to 6	1	16.7
6 to 12	2	33.3
12 to 18	1	16.7
18 to 24	2	33.3
First child (Yes)	3	50
Any breastfeeding in the postpartum (Yes)	5	83.3
Partner / Significant Other help with parenting duties in the postpartum (Yes)	3	50
Live with someone who smokes (Yes)	3	50
Age at initiation of smoking (15 and above)	4	66.7
Daily cigarette usage prior to pregnancy (10-20)	5	83.3
Number of cessation attempts (0-4)	4	66.7

4.3.2 Smoking History Summaries

All six women began their pregnancy actively smoking (Figure 3 shows smoking history across pregnancy and postpartum). All women attempted cessation during the second or third trimester, and all, but one woman (Participant 2), was abstinent at the time of birth. Four women maintained abstinence during the postpartum period at least until the time of their interview (Participants 1,4,5,6). One participant (Participant 2) reported relapse to daily smoking when

questioned during the interview. Another participant (Participant 3) alternated between relapse and cessation during the postpartum period and was actively abstinent when interviewed.

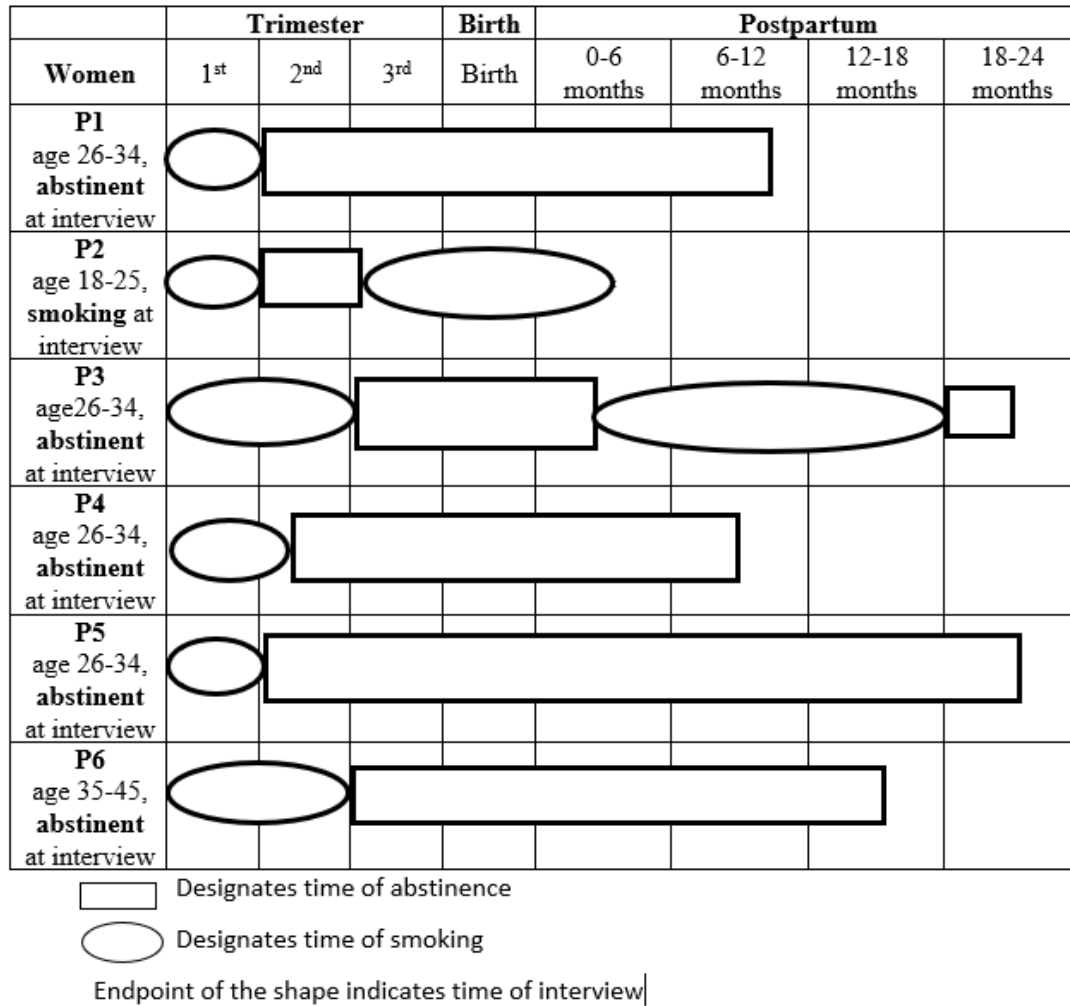


Figure 3 Smoking history across pregnancy and postpartum

4.3.3 Categories with themes and exemplar quotes

Focused coding led to the identification of themes (Miles et al., 2014) that were supported by exemplar quotes. Themes were clustered into four categories: motivations for cessation and

abstinence, processes for cessation and abstinence, cycles of abstinence and relapse, and considerations regarding use of tobacco (Table 12).

Table 12 Themes Clustered into Categories Regarding Smoking Behavior in the Perinatal Period

Themes (Participant IDs)	Categories
Cessation for fetus / baby (2,3,4,5,6) Cessation for self / health (1,3,5,6) Cessation for significant other / friend (3)	Motivations for Cessation and Abstinence
Controlling tobacco use during pregnancy (6) Using effective coping strategies to avoid smoking (3,4,5,6) Using ineffective coping strategies to avoid smoking (1,5) Pausing versus quitting (1,3) Quitting easy during pregnancy (4) Quitting hard during pregnancy (1,3,5,6) Replacing smoking (1,3,4,5,6) Experiencing available social support for cessation or abstinence (1,3,4,5,6) Not experiencing available social support for cessation or abstinence (1,2,3,5,6) Spouse / significant other mandating smoking cessation (1,3) Identifying successful strategies for cessation (1,2,4,6) Identifying unsuccessful strategies for cessation (2,6)	Processes for Cessation and Abstinence
Abstinence mindset (1,3,4,5,6) Abstinence then relapse in antepartum (2) Anticipated postpartum relapse to smoking (1,3,5) Economic motivation for abstinence (1) Environmental motivation for abstinence (1,2,3,5,6) Insights about tobacco use or avoidance (1,2,3,4,5,6) Me time (3,5) Multiple quit attempts (2,3,5) Near miss for smoking relapse (1) Penalties of relapse (3) Perpetual risk of relapse (1,3,6) Rationale for smoking while breastfeeding (3) Rewards of cessation / abstinence (3,5,6) Serial cessation / relapse during pregnancy (5) Triggers for potential tobacco use (1,2,3,4,5,6)	Cycles of Abstinence and Relapse
Perceived benefits of smoking (2) Rules for personal smoking around child (3) Secret smoker (3,5) Addictiveness of smoking (1,3,5,6) Socialization while smoking (3,5) Bans on others smoking around the child (4, 5,6) Social aspect of tobacco use (1,3) Social stigma of smoking (3,5) Unexpected experience with tobacco use (1,3,6) Working and smoking (5)	Considerations Regarding Use of Tobacco

4.3.3.1 Motivations for Cessation and Abstinence

Collected under this category were the various explanations given for tobacco cessation or abstinence efforts during the perinatal period. These explanations revealed the forces supporting avoidance of tobacco products in each woman's life. In total, three "motivators" were identified and became themes that formed this category.

Participant 5 expressed the sake of the fetus as the motivation for cessation efforts. *"So, I was just so worried and like I felt so blessed to be pregnant with twins, I was like I need to make sure I do everything I could to make sure they are healthy. So, I was still smoking a little bit but when I found out it was twins, I totally stopped; I literally quit within like three days and then I have been good ever since."* Participant 1 expressed abstinence efforts in the postpartum period connected to self / health. *"I don't want wrinkly skin or heart disease."* For participant 3, expressions from a significant other / friend were influential in her abstinence in the postpartum period. *"...nobody had ever said like, if you don't stop, I'm not going to hang out with you anymore."*

4.3.3.2 Processes for Cessation and Abstinence

Grouped under this category were the various activities participants reported when describing their process for cessation and/or abstinence during the perinatal period. Examples of these "actions" included controlling, using, replacing, experiencing, mandating, and identifying. Because of the nature of tobacco decision-making, sometimes the reported activities were more supportive of relapse as opposed to continued abstinence. In total, twelve themes were identified and then grouped to form this category.

Participant 6 described her actions to control her tobacco use during pregnancy. *"I knew going into the pregnancy I smoked pretty heavily so I knew it would be best, like anxiety-wise, to*

like wean myself off gradually instead of just cold turkey.” Other participants were able to identify successful replacements to avoid smoking and had recommendations for others. From Participant 5, *“So learning to find comfort in new, healthy things, whether it be nature, exercise, you know, creative outlets like art, you know. I just recommend finding positive replacements for it so that you don’t feel that emptiness.”* Participant 4 relayed the importance of available social support when describing her continued abstinence from smoking in the postpartum period. *“My husband does what he can, he tries to keep me calm while entertaining the children after they have been very agitating.”* For Participant 2, common pharmaceutical strategies to aid in smoking cessation were not successful. *“I tried that nicotine gum, I tried the nicotine patches, and they just didn’t work.”*

4.3.3.3 Cycles of Abstinence and Relapse

Clustered together in this category were the various themes representing the contributing factors to tobacco decision-making for these participants. Several forces, such as economic motivation or the rewards of being smoke-free were detailed. Recognition of the precarious nature of abstinence led to discussions about triggers leading to relapse, penalties of relapse, and the necessary mindset to avoid relapse. For some, a return to smoking in the postpartum was planned, even during abstinence during the pregnancy. For others, postpartum smoking behavior occurred while actively trying to avoid exposing the newborn.

Participant 1 was aware of the possibility her employer may screen for tobacco use in the future. Her continued abstinence could help her avoid *“trouble with my job if I was still smoking.”* Participant 4 shared a common trigger (stressful event) during the postpartum period. *“A few times, it did kind of get stressful, I have a four-year-old so kind of wrestle with her and then when he gets in his little screaming fits, and she gets in a screaming fit.”* Participant 6 described the ongoing

fear of future relapse. *“It’s an evil, evil thing. I don’t think so, I would hope that it wouldn’t be a possibility, but I think it could be a possibility, you know. I’ve seen plenty of people quit and start again after various times away from it so I just don’t need the temptation.”*

When asked to reflect on her pregnancy and any plans she may have had regarding smoking intentions after the birth, Participant 5 reported *“I think in the back of my mind I was kind of like I’m probably going to have a cigarette after I deliver, what if I have some whenever...”*. Participant 3 attempted to rationalize her smoking behavior while breastfeeding. *“And when she started sleeping through the night, I guess that’s when the opportunity came to me, presented itself that hey, I have eight hour or a six hour window that if I smoke one cigarette, I have six hours for the nicotine to leave, leave my system, and then it would be safe for me to breastfeed her again in the morning.”*

4.3.3.4 Considerations Regarding Use of Tobacco

Identified under this category were the various themes that covered the role of tobacco use and the various smoking-related situations women encountered during the perinatal period. The connection between smoking and the social network or work environment was identified. The addictiveness of smoking and perceived social stigma of tobacco use during pregnancy was described. Efforts to negotiate the postpartum period while still using tobacco products were reported by both participants (Participants 2 and 3) with a return to smoking in the postpartum period.

Social time with friends, when the woman was child-free, became potential relapse moments. As related by Participant 3, *“Dada’s got the baby for the day and night... I’m hanging out with my girlfriends, yeah, if they’re smoking, I can smoke.”*. Even after more than twelve months had passed since last tobacco use, Participant 6 tried to share the addictiveness of tobacco

products. *“It’s a physical thing too, but your mind’s stronger than anything really.”* Participant 2 described a perceived benefit of smoking. *“...for me every time I take in a drag, it, it just relieves a bunch of nonsense and bull crap that goes on in my head, and it blocks everything else out for that moment.”* Participant 3 described the rules she followed regarding smoking around her child. *“...but I didn’t smoke around my daughter. So, no smoking inside, no smoking in the car, and I wouldn’t allow people to smoke around her. I would still only smoke after she went to bed.”*

4.3.4 Mapping of Themes to the Transition to Motherhood

Each woman was asked during the interview to describe if the baby’s age fit into any decision-making about smoking in the postpartum period. Experiences recalled by each participant during their interview were later converted to themes that were mapped to specific time periods over the course of their perinatal journey (Table 13). This allowed for a retrospective exploration of the connections between themes (behaviors) and the trajectory of tobacco use during the stages of transition to motherhood for each participant.

For Participant 1, she expressed it was hypocritical to consider abstinence during pregnancy as different than abstinence in the postpartum period. She maintained abstinence after deciding to make this behavior change based on herself, not the baby. Participant 2 returned to smoking during the pregnancy and continued smoking in the postpartum period. She connected her smoking to anxiety symptoms and said her social support system and environmental exposure to smoking contributed to her relapse. During a time of postpartum relapse to smoking, Participant 3 listed her child’s lengthening sleep cycles as an opportunity to continue smoking while preventing any negative neonatal impact. Eventual abstinence occurred when she decided to completely change her lifestyle and friend network. While these changes were based on improving

herself, Participant 3 did report staying abstinent would be a good example for her child. Information from healthcare personnel, provided to Participant 4 about the impacts of maternal smoking on her child, did contribute to her abstinence efforts. To sustain her non-smoking status, she relied on her available support system and discovered ways to divert her attention away from her desire for tobacco. Participant 5 revealed that a difficult pregnancy and her housing situation in the postpartum limited her to a non-smoking status. Several changes, including a new job and a new house, provided support to her efforts to remain abstinent. Even environmental exposure to smoking via her family members did not cause her to relapse. Plans for a minimum of one year of breastfeeding was described by Participant 6. Family and friends were required to avoid smoking around her child. When the stresses of the postpartum period increased, she would use some breathing exercises and get outdoors to avoid returning to smoking.

Table 13 Themes per Participant for their Trajectory of Tobacco Use During the Stages of Transitioning to

Motherhood

	STAGE 1 – PREPARING FOR MATERNAL ROLE Pregnancy: commitment, attachment, and preparation for baby	STAGE 2 – ESTABLISHING MATERNAL IDENTITY Postpartum (0-6 weeks): acquaintance, learning, and physical restoration	STAGE 3 – MOVING TOWARD NEW NORMAL Postpartum (2-16 weeks): assuming new maternal role	STAGE 4 – ACHIEVEMENT OF MATERNAL IDENTITY Postpartum (16+ weeks): competent and confident in role	TIMING OF THE INTERVIEW in the POSTPARTUM PERIOD and SMOKING STATUS
P1	-Cessation for self / health -Identifying successful strategies for cessation	-Using ineffective coping strategies to avoid smoking	-Pausing vs. quitting -Abstinence mindset	-Cessation (continued) for self / health	10-months Abstinent
P2	-Cessation for fetus / baby -Triggers for potential tobacco use	-Identifying unsuccessful strategies for cessation	-Triggers for potential tobacco use -Perceived benefits of smoking		3-months Smoking
P3	-Cessation for self / health -Cessation for fetus / baby	-Rationale for smoking while breastfeeding	-Rules for personal smoking around child	-Multiple quit attempts -Cessation for fetus / baby -Cessation for self / health	21-months Abstinent
P4	-Quitting easy during pregnancy -Experiencing available social support for cessation or abstinence	-Cessation (continued) for fetus / baby	-Triggers for potential tobacco use -Using effective coping strategies to avoid smoking	-Abstinence mindset	9-months Abstinent
P5	-Cessation for fetus / baby	-Insights about tobacco use or avoidance	-Abstinence mindset -Cessation for self / health	-Replacing smoking	22-months Abstinent
P6	-Controlling tobacco use during pregnancy -Cessation for fetus / baby	-Perpetual risk of relapse -Insights about tobacco use or avoidance	-Experiencing available social support for cessation or abstinence -Rewards of cessation / abstinence	-Triggers for potential tobacco use -Using effective coping strategies to avoid smoking -Cessation for self / health	15-months Abstinent

Note P2 Interview conducted prior to 16-weeks postpartum, hence no data collected for stage 4.

4.4 Discussion

This qualitative descriptive study explored the process of abstaining from smoking during pregnancy and preventing postpartum relapse to smoking in the context of transitioning to motherhood. Six participants shared their stories, describing their smoking histories and explaining their tobacco status from the onset of pregnancy to the time of interview after the birth. Each interview provided insight into the individual's trajectory of postpartum smoking abstinence or relapse. All participants quit smoking during the pregnancy, primarily to protect the health of the fetus and / or their own health. All but one was abstinent at the time of postpartum interview.

All participants endorsed some themes within each of the four categories. In general, the themes within the categories of Motivations for Cessation, the Processes for Cessation and Abstinence, and Cycles of Abstinence and Relapse, did not differ between those who remained abstinent (Participants 1, 4, 5, 6) versus those who relapsed (Participants 2 and 3). Both groups reported similar activities, motivations, and contributing factors surrounding their decision-making regarding tobacco use that mirrored published findings (Kia et al., 2018). However, two unique themes within the category of Considerations Regarding Use of Tobacco (perceived benefits of smoking and rules for personal smoking around the child), were only endorsed by the two participants who relapsed (P2 and P3). These findings are consistent with previous research on perinatal smoking (Constantine et al., 2014) that found postpartum relapse was more likely if the woman believed tobacco was no longer harmful to the baby after the birth, even if breastfeeding was planned. Lack of understanding related to the dangers of any perinatal smoking should be corrected to support women's decision-making regarding sustaining abstinence as an important aspect of health for themselves and their offspring.

A concept analysis of relapse (Simonelli, 2005) identified several important antecedents associated with risk of relapse including limited availability of social support, strong existence of the behavior in question within the social network, perceived level of addiction, and negative emotional state. The two women in this study who relapsed described the lack of a supportive social system and continued interaction with friends who smoke during their interviews. Women in the childbearing cycle with a previous history of tobacco use should be informed about the connections between these antecedents and ways to prevent smoking relapse.

We also explored possible connections between the trajectories of perinatal tobacco use and the stages within the theory on “Becoming a Mother” (Mercer, 2004). Internationally Mercer’s work is considered a framework to understand the process of establishing a maternal identity. Various characteristics of the postpartum period have been investigated within the structured framework of Mercer’s theory. These include gestational age of the newborn, feeding style for the newborn, and maternal mood in the postpartum. To our knowledge this is the first study to apply this theory to a health behavior change such as smoking in the perinatal period. Using these stages as a guide, we mapped the themes and smoking status of each participant during the time that corresponded to each stage. For the women of this study, themes related to controlling tobacco use, ceasing smoking because of self or the fetus, finding support for their abstinence, and identifying cessation strategies, were consistent with the milestones of stage 1: Preparing for the Maternal Role during pregnancy. By six weeks after the birth, themes related to contemplating their continued abstinence, fearing a potential relapse, and considering how to combine breastfeeding and smoking, were consistent with the milestones of Stage 2: Establishing Maternal Identity. Through week sixteen postpartum, themes regarding determining relapse triggers, developing coping strategies, and exploring their abstinence mindset were consistent with the

milestones of Stage 3: Moving Toward a New Normal. For the participants who were interviewed beyond month four of the postpartum, all but one remained abstinent and endorsed themes such as finding replacements for smoking and using effective coping strategies to avoid smoking which were consistent with the milestones of Stage 4: Achievement of Maternal Identity. Women who quit smoking for the sake of the fetus / baby, and later recognized the benefits of cessation for self, were all successful in remaining abstinent from smoking in the postpartum period. Acknowledgement of promoting one's health as a non-smoking mother is consistent with the goals stage 4. This finding reinforces the importance of assisting women in recognizing perinatal abstinence from smoking benefits not only the fetus, but also themselves.

Our findings show that for most participants, the ability to remain abstinent may parallel progression through the stages of becoming a mother. Thus, the transition to motherhood may be a useful framework for understanding the specific challenges and motivations of postpartum women as they try to promote a healthy behavior (abstain from smoking) while progressing through the stages of becoming a mother. Continued research is needed to explore how the framework might promote the process of becoming a mother and promote other healthy lifestyle behaviors concurrently.

4.5 Limitations

The findings and conclusions of this study were based on interviews with six women. Self-report was utilized to identify abstinent or relapse status for each participant. While data saturation was reached the sample was relatively small and homogeneous regarding race, maternal age, and breastfeeding status. Potential confounding variables that were not addressed during the study

include use of e-cigarettes or nicotine-replacement therapy, as well as any vaping activities. Recruitment activities encountered some challenges in enrolling participants. Foremost, the target population was in the midst of a transition. These women were busy, fatigued, and had limited spare time to participate in a research study, therefore selection bias may also have impacted this study. Some of the women were very reflective during the interview process, others limited their responses to short sentences. Finally, women were enrolled in the study up to 24 months after giving birth. Memories of the challenges encountered related to tobacco decision-making, as well as the nuances of their transitions to motherhood may have faded.

4.6 Implications

4.6.1 Suggestions for Future Research

- Learn more from participants during the antepartum period
- Interact with participants closer to the time of the birth
- Plan for multiple interviews during the postpartum period
- Recruit a more diverse sample of participants
- Identify the “classic relapser” and explore their stories more deeply
- Increase recruitment activities to include more voices of those who relapse

4.6.2 Suggestions for Future Practice

- Increase engagement during the 4th trimester to support continued abstinence

- Integrate encouragement for continued cessation within the child's pediatric visits
- Develop activities for nursing students to engage with those in the childbearing cycle encountering tobacco decision-making issues

4.7 Conclusions

The importance of preventing postpartum relapse to smoking has been well established in the literature. The dangers to the mother, newborn, and newly created family are known and communicated during the perinatal period but any misconceptions about safe smoking practices, especially postpartum smoking, should be corrected. Statistics demonstrate that a pivot to abstinence is much more likely in the prenatal period, but sustained abstinence is challenging moving into the postnatal period. Antecedents associated with relapse should be discussed during the childbearing cycle, assisting women to identify potential triggers and proactively work to prepare for these situations. Continued exploration is needed to determine the best way to blend successful behavior change with the transition to motherhood.

Appendix A Preliminary Study 2 Documents



(717) 783-2548

January 9, 2014

Susan E. Bare, MSN, CNM, RN
University of Pittsburgh, School of Nursing
430 Franklin Avenue, Apt B-1
Pittsburgh, PA 15221

Dear Ms. Bare:

RE: Application Number: 1C-2618

Study/Project Title: An examination of the relationships among characteristics of new mothers, situational factors, smoking during pregnancy and postpartum smoking relapse.

Thank you for forwarding a completed application detailing the activities of your study as referenced above. With the information you have provided in your application, I am able to approve your request for data from the PA Department of Health's PRAMS files.

You will be working with Jim Rubertone of my staff to obtain this information and who will be contacting you with any questions he may have regarding this data request. If you have any questions, please contact Jim at 717-783-2548.

Sincerely,

A handwritten signature in black ink that reads 'Diane M. Kirsch'.

Diane M. Kirsch, RHIA
Director, Division of Statistical Registries



University of Pittsburgh
Institutional Review Board

3500 Fifth Avenue
Pittsburgh, PA 15213
(412) 383-1480
(412) 383-1508 (fax)
<http://www.irb.pitt.edu>

Memorandum

To: Susan Bare
From: Christopher Ryan, Ph.D., Vice Chair
Date: 2/5/2014
IRB#: PRO14020013
Subject: An examination of the relationship among characteristics of new mothers, situational factors, smoking during pregnancy and postpartum smoking relapse.

The above-referenced protocol has been reviewed by the University of Pittsburgh Institutional Review Board. Based on the information provided to the IRB, this project includes no involvement of human subjects, according to the federal regulations [§45 CFR 46.102(f)]. That is, the investigator conducting research will not obtain information about research subjects via an interaction with them, nor will the investigator obtain identifiable private information. Should that situation change, the investigator must notify the IRB immediately.

Given this determination, you may now begin your project.

Please note the following information:

- If any modifications are made to this project, use the "Send Comments to IRB Staff" process from the project workspace to request a review to ensure it continues to meet the determination.
- Upon completion of your project, be sure to finalize the project by submitting a "Study Completed" report from the project workspace. 6/29/17

Please be advised that your research study may be audited periodically by the University of Pittsburgh Research Conduct and Compliance Office.

9/1/2020

York College of Pennsylvania Mail - Request for permission to use a published article



Susan Bare <sbare1@ycp.edu>

Request for permission to use a published article

2 messages

Susan Bare <sbare1@ycp.edu>
To: Jennifer Neidig <jneidig@psna.org>
Cc: Susan Bare <sbare1@ycp.edu>

Tue, Sep 1, 2020 at 1:47 PM

Good Day,

I am a proud PSNA member and a nurse educator at York College of Pennsylvania. I also am in the final stages of completing my doctoral work through the University of Pittsburgh School of Nursing. My defense will occur at some point during the current academic year. I was fortunate enough to have a publication in *Pennsylvania Nurse* in 2017 detailing some of my initial research investigating postpartum relapse to smoking.

Bare, S.E., DeVito Dabbs, A., & Sereika, S.M. (2017). Smoking after pregnancy: Factors associated with a relapse to smoking in Pennsylvania. *Pennsylvania Nurse*, 2, 4-9.

I am writing to request permission to include this publication in my dissertation document since it was foundational work informing my doctoral study. If there is a protocol for making this request, I would be happy to complete the process. At a minimum, if allowed to use the article, I would include the citation in a footnote and the permission notification would be in the appendices. If other policies guide this situation, I would be happy to comply.

Thank you for considering this request.

Susan Bare, PhD(c)

—
Susan E Bare, MSN, CNM, RN
Instructor of Nursing
Lead Faculty for NUR 350/351 - Women's Health
The Stabler Department of Nursing
York College of Pennsylvania
Diehl Hall 138
York, PA 17403

Office hours: Monday & Wednesday 10:30 am - 12:30 pm
Tuesday 10:00 - 11:00 am
Available by appointment also

717-815-2230 (office)
717-849-1651 (fax)
sbare1@ycp.edu

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Jennifer Neidig <jneidig@psna.org>
To: Susan Bare <sbare1@ycp.edu>

Tue, Sep 1, 2020 at 2:33 PM

Susan,

<https://mail.google.com/mail/u/0?ik=7bd514932a&view=pt&search=all&permthid=thred-a%3Ar1477466609010201522&simpl=msg-a%3Ar235829309> ... 1/2

9/1/2020

York College of Pennsylvania Mail - Request for permission to use a published article

Thank you for your e-mail. Please proceed and let us know if you need anything.

Sincerely,

Jennifer Neidig

Chief of Staff

Pennsylvania State Nurses Association

jneidig@psna.org

3605 Vartan Way, Suite 204, Harrisburg, PA 17110

P: 717-798-8942, F: 717-657-3796

Twitter @panurses

Appendix B Dissertation Study Ethics Approvals



APPROVAL OF SUBMISSION (Expedited)

Date:	June 13, 2022
IRB:	CR20070224-003
PI:	Susan Bare
Title:	Exploration of Smoking Abstinence and Relapse in the Context of Transitioning to Motherhood
Funding:	None

The Institutional Review Board reviewed and approved the above referenced study. The study may begin as outlined in the University of Pittsburgh approved application and documents.

Approval Documentation

This study meets eligibility criteria to be released from continuing review (renewal). It is still your responsibility to submit modifications, reportable events, and a termination report when the study is complete.

Review type:	Continuing Review - Data Analysis Only
Approval Date:	6/13/2022
Expedited Category	(8)(c) Data analysis, (6) Voice, video, digital, or image recordings, (7)(b) Social science methods, (7)(a) Behavioral research

As the Principal Investigator, you are responsible for the conduct of the research and to ensure accurate documentation, protocol compliance, reporting of possibly study-related adverse events and unanticipated problems involving risk to participants or others. The HRPO Reportable Events policy, Chapter 17, is available at <http://www.hrpo.pitt.edu/>.

Continuing review (CR) can be submitted by clicking "Create Modification/CR" from the active study at least 5 weeks prior to the expiration date.

Clinical research being conducted in an UPMC facility cannot begin until fiscal approval is received from the UPMC Office of Sponsored Programs and Research Support (OSPARS).

If you have any questions, please contact the University of Pittsburgh IRB Coordinator, [Kathleen Hurst](#).

Please take a moment to complete our [Satisfaction Survey](#) as we appreciate your feedback.

Carl Seaquist, MBA (Pitt) Ph.D. (Penn)
Associate Dean of Academic Affairs
Interim Chair, IRB

TO: Susan Bare
PROJECT: An Exploration of the Process of Abstaining from Smoking and
Preventing Relapse to Smoking in the Context of Transitioning to
Motherhood
DATE: April 6, 2016

Dear Professor Bare ,

Based on the information provided in your email to me of April 6, 2016 (in which you state that the only role that York College will play in your research is the following: providing a place to temporarily store hard-copy data, as well as a quiet place to conduct phone interviews with subjects who are not, except coincidentally, affiliated with York College), I conclude that this research project is solely under the jurisdiction of the University of Pittsburgh and does not require any further IRB review at York College.

You may feel free to share this letter with the Pitt IRB.

Feel free to contact me if you have any questions. Thank you.

Carl Seaquist

Appendix C Dissertation Study Recruitment Materials



Smoking abstinence and relapse during your child's first year

You may be eligible for a research study at the University of Pittsburgh School of Nursing.

If you:

- gave birth within the past 12 months
- are at least 18 years old
- were a smoker before pregnancy
- tried or succeeded at cessation during the pregnancy

Parking expenses will be covered and a package of diapers will be provided with participation.



University of Pittsburgh | ctsi | CLINICAL + TRANSLATIONAL SCIENCE INSTITUTE

Pediatric PittNet 

Contact Information:

Postpartum Smoking Abstinence and Relapse

Sue Bare

412-592-1298

seb110@pitt.edu

Research Study for POSTPARTUM WOMEN

This is a study to learn about the experiences of mothers who quit smoking during pregnancy.

**What do you
have to say?**



**What can I learn from
you about smoking and
motherhood?**



Women who are now non-smokers and women who have returned to smoking are eligible.

IMPORTANT RESEARCH STUDY DETAILS

- Interview on the challenges of the first year of motherhood
- Participants will receive a local store gift card for \$10

For more information, contact Sue Bare at

717-815-2230 or seb110@pitt.edu

Research conducted through the University of Pittsburgh



Hello,

My name is Sue Bare and I am a nurse researcher at the School of Nursing at the University of Pittsburgh. I am also a maternal-child healthcare provider for over 20 years, first as a bedside L&D nurse and then as a full-scope certified nurse midwife. I am currently working on my doctorate and also act as an OB clinical instructor at Magee-Womens Hospital of UPMC for the junior-level undergraduate nursing students.

My research interest is postpartum relapse to smoking. I want to talk with women who smoked before pregnancy and quit smoking during pregnancy. Now, when they are in the first year after the birth, I want to learn about the tasks, needs, and challenges that lead to relapse or continued abstinence in the postpartum period.

This project is approved by the University of Pittsburgh IRB (MOD15020049-01 / PRO15020049) and will be conducted over the telephone. I am asking for your help by posting the flyer and by mentioning the study to potentially eligible women if appropriate. The details of the study are on the flyer and women may call me at the listed number if interested. I have enclosed additional copies of the flyer for women to take as a handout. Copying is permitted or please contact me for more handouts.

I sincerely thank you for your time and consideration.

Susan Bare

Susan E. Bare, PhD(c), MSN, CNM

336 Victoria Building
3500 Victoria Street
Pittsburgh, PA 15261
(570) 713-4596
seb110@pitt.edu

SCREENING PROCEDURE FORM

Date: _____

Study Introduction:

Thank you for calling to find out more about our research study. [OR] I am returning your call to provide more information about our research study.

My name is Susan Bare and I am a doctoral student researcher at the University of Pittsburgh School of Nursing. The purpose of our research study, *Exploration of Smoking Abstinence and Relapse in the Context of Transitioning to Motherhood*, is to look at the experiences of women who were smokers before a recent pregnancy and stopped smoking during the pregnancy. Specifically, we want to learn about your life as you settle into being a mother and the decisions you make regarding tobacco use.

The study will require one telephone session. During the discussion I will suggest a few topics and then listen to your answers. The session will last approximately 60 minutes and at the end I will provide a small gift for your participation.

Do you have any questions or concerns? Now that you have a basic understanding of the study, do you think you might be interested in participating?

NO: Thank you for responding to the study advertisement. Have a nice day. [end call]

Caller is interested in study:

Before enrolling women in this study, we need to determine if you may be eligible to participate. I would now like to ask you a series of questions about you, your recent pregnancy and birth, as well as your smoking history. It will take approximately 10 minutes of your time.

There is a possibility that some of these questions may make you uncomfortable or distressed; if so, please let me know. You can skip questions you do not wish to answer.

I will keep all the information I receive from you by phone, including your name and other identifying information, confidential.

The purpose of these questions is to determine whether you may be eligible to participate in the study. Additional screening at a later time may be necessary beyond answering these questions. Remember, your participation is voluntary; you do not have to complete these questions. Please feel free to stop me at any time if you have questions or concerns. Do I have your permission to ask you these questions?

1) Are you 18 years of age or older? YES NO 18-25 26-34 35-45

2) Are you able to answer a questionnaire in English without difficulty? YES NO

3) How old is your child? 0-3 mos. 4-6 mos. 7-9 mos. 10-12 mos.

Is he/she healthy YES NO

4) Is this your first child? YES NO

5) Did you smoke before your pregnancy? YES NO

6) Did you stop smoking during pregnancy? YES NO

Were you a non-smoker during the third trimester? YES NO

7) Are you currently smoking? YES NO

8) How long did you breastfeed your baby? None _____

Post-response communication:

Based on your answers to the questions, it appears you may eligible to participate in the research study. May I schedule you for an interview time now? The telephone session may take up to 60 minutes.

Are you agreeable to providing contact information so I can reach you in the future?

YES name: _____ email: _____

phone: _____ text: _____

Best times of day to contact: _____

Interview date and time: _____

Post-response communication:

Unfortunately, based on your responses, you are not eligible to participate in the research study. Thank you for talking with me today and have a nice day.

Study Team Contact Information:

Thank you for taking the time to talk with me today. If you have any questions or concerns, please feel free to contact me. My name is Sue Bare and I can be reached at 412-592-1298 or 717-815-2230 and/or seb110@pitt.edu.

TELEPHONE INTERVIEW – CONSENT FORM

Study ID: _____

Study Introduction:

Hello again, this is Sue Bare the doctoral student researcher at the University of Pittsburgh School of Nursing. I am calling you because you were successfully screened and showed interest in our research study, *Exploration of Smoking Abstinence and Relapse in the Context of Transitioning to Motherhood*. We want to learn about your life as you settle into being a mother and the decisions you make regarding tobacco use.

Your participation in the study will include a 45-60 minute discussion with me. The telephone call will be audio-recorded. In the future I may contact you by phone to clarify your responses. As the analysis proceeds, I may contact you by phone to review the findings. Your study activity will include participating in one telephone interview, possibly a telephone follow-up interview, and possibly a telephone call to review the study findings.

Risks and Benefits of Participation:

The material discussed could cause some discomfort and you may choose to not answer any question. Your personal information disclosed during the study could be discovered if there was a breach in security. Your identifiers will be removed from all audio recordings and all study files will be stored in a secure manner at the University of Pittsburgh, School of Nursing.

There are no anticipated direct benefits to you.

Compensation for Participation:

For participating in the individual interview, you will receive an electronic gift card worth \$10 to a local store. If you are selected for a follow-up interview, you will receive another electronic gift card worth \$10 to a local store. There will be no compensation if you are contacted to review the study findings.

Verbal Informed Consent:

Participation is completely voluntary; you may stop participating and withdraw from the study at any time. Do you have any questions?

If you have any questions or concerns about your participation in this study, contact me, Sue Bare, at 412-592-1298 and/or seb110@pitt.edu.

Voluntary Consent:

Do you understand and agree to participate in this telephone interview? YES NO

YES → Proceed to Discussion Guide

NO → Thank you for listening to me and have a nice day.

Appendix D Dissertation Study COREQ Checklist

COREQ (CONSOLIDATED CRITERIA FOR REPORTING QUALITATIVE RESEARCH) CHECKLIST

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	89
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	87
Occupation	3	What was their occupation at the time of the study?	89
Gender	4	Was the researcher male or female?	89
Experience and training	5	What experience or training did the researcher have?	89
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	89
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	89
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	89
Domain 2: Study design			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	88
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	88
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	88
Sample size	12	How many participants were in the study?	88
Non-participation	13	How many people refused to participate or dropped out? Reasons?	88
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	89
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	89
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	93
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	90
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	90
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	89
Field notes	20	Were field notes made during and/or after the interview or focus group?	90
Duration	21	What was the duration of the interviews or focus group?	89
Data saturation	22	Was data saturation discussed?	91
Transcripts returned	23	Were transcripts returned to participants for comment and/or	90

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	91
Description of the coding tree	25	Did authors provide a description of the coding tree?	91
Derivation of themes	26	Were themes identified in advance or derived from the data?	91
Software	27	What software, if applicable, was used to manage the data?	91
Participant checking	28	Did participants provide feedback on the findings?	91
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	96
Data and findings consistent	30	Was there consistency between the data presented and the findings?	95
Clarity of major themes	31	Were major themes clearly presented in the findings?	95
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	99

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