Depression, Anger, Anxiety and Smoking in Pregnant Adolescents

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Abstract

Purpose: To explore the relationships between smoking dependence behavior, depression, anger, and, anxiety in pregnant adolescents. Research hypotheses were: 1. Depression, anger, anxiety, and are mood states that are present in pregnant adolescents who smoke. 2. Depression, anger, and, anxiety are inter-related. 3. Depression, anger, and anxiety affect smoking dependent behavior of pregnant teens who began smoking prior to pregnancy. 4. Depression, anger, and, anxiety affect smoking consumption of pregnant teens who smoke. **Methods:** Secondary data analysis of baseline data from a longitudinal study, "Nursing Intervention for Young Pregnant Smokers" (PI: S. Albrecht, RO1 NR 03233) was performed. Of 224 eligible adolescents, 142 pregnant, smoker, adolescents signed an informed consent. One-hundred, eight complete and valid cases were analyzed for their responses to the following instruments: Modified State/Trait Anxiety Inventory (STAI), Modified Center for Studies of Depression (CES-D), Confidence and Temptation Scale, Fagerstrom Tolerance Nicotine Dependence Test (FTND). **Results:** Descriptive and exploratory data analyses were used to identify outliers, assess missing data, and verify assumptions. In the correlational analysis, anger, anxiety, and depression are correlated ($p = .000$). In additional analysis, self-efficacy was correlated with anger ($p = .007$), anxiety ($p = .001$), and FTND score ($p = .002$). Hierarchial Multiple Regression, controlling for covariates, revealed that self-efficacy significantly predicted smoking dependence behavior ($p =$

.006). Depression, anger, and, anxiety were not realized as predictors in this sample. However, an exploratory analysis of self-efficacy, the confidence that the adolescent express that smoking cessation could be achieved, revealed an inverse relationship to smoking dependence behavior. **Conclusions and Implications:** Self-efficacy was inversely associated with smoking dependence behavior in this sample, while altered mood states did not influence smoking dependence behavior or smoking consumption. This analysis suggests that enhancing self-efficacy should be tested as a part of the intervention for smoking prevention and cessation programs in adolescents.

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1.0   CHAPTER ONE

1.1   INTRODUCTION

The purpose of this study was to explore the relationship of mood states with smoking dependence behaviors and smoking consumption in pregnant teenagers. Adolescence is a period of transition to early adulthood.   Biological, psychological, and social characteristics of adulthood have their beginnings and development in adolescence (Lerner, 2002). With all of the changes occurring during the teenage period, mood states are commonly altered and can affect the adolescent's experience at school, work, and home.   Also common in adolescence are problem behaviors such as drinking, illicit drugs, promiscuous and unprotected sex, gambling, and smoking. Teens who take on one of these behaviors are more likely to adopt others. For example, teenage girls who smoke may also drink or have unprotected sex (Donovan, Jessor, & Costa, 1988). Many factors influence a teen's participation in such experimentation, including the teen's friends, parents, activities, and successes. In addition, fluctuating moods may increase a teen's vulnerability to risk-taking and choices especially in the presence of peers (Boyles, 2007).

As reported from 2002 data, 16.7% of pregnant teens age 15 to 17, and 18.2% of pregnant teens age 18 to 19, smoke (Mathews, 2004). Smoking cessation interventions have been deemed especially important for this group, but have exhibited limited success. Mood states

such as depression, anger, and anxiety have been shown to negatively affect pregnancy outcomes and smoking in pregnancy. Not only can smoking dependence behavior be affected, but research has shown that mood states do play a role in other high risk behaviors such as underage drinking, promiscuity, and illegal drug use (Donovan, Jessor, & Costa, 1988). Therefore, the relationship of mood states, smoking and pregnancy should be explored to provide insight for future therapeutic interventions for smoking cessation during teen pregnancy.

Altered mood states have been reported in the United States, both in adults and children. The prevalence of depression in children and adolescents has been reported to be as high as 20% (Costello, 1995). Depression has been correlated with anxiety and poor outcomes in pregnancy. From a synthesis of the literature regarding adolescent mothers, Kassel (Kassel, Stroud, & Paronis, 2003) reported that depression and smoking behavior have a reciprocal relationship. Depression influences increased smoking and increased smoking can affect depression. Morriss (Morriss, 2005) found that adolescent maternal depression contributed to smoking progression and depressive symptoms. Depression and mood states such as anxiety and anger, independently and combined, could have a serious influence and consequence in the target population.

Anger has rarely been studied in pregnant adolescent populations (Ponirakis, Susman, & Stifter, 1998). Cornelius (Cornelius, Leech, & Goldschmidt, 2004) studied adolescent pregnant smokers and found that aggressive problems were related to persistent smokers. Unfortunately, Cornelius (Cornelius, Leech, & Goldschmidt, 2004) did not specifically define "aggressive problems," therefore comparisons are difficult to make between anger and other closely related mood states, such as aggression and hostility. In the literature, anger is often associated with hostility and aggression. Clearer definitions need to be evaluated and incorporated in this area. Ballinger (Ballinger, 1982) found that hostility was correlated with anxiety in pregnant women.

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Therefore, if anger is correlated with anxiety, and depression is correlated with anxiety, anger should be evaluated when studying mood states in pregnant, adolescent, smokers, especially since there is very little research done evaluating anger in pregnancy. Additional research is needed to evaluate anger and then, establish a model of the role of anger in a sample of pregnant smoking teens. Anger could have a serious influence and consequence in pregnant adolescents.

The rate of anxiety in children and adolescents has been reported to be as high as 19% (Costello, 1995). Adolescents with anxiety are prone to nicotine dependence and the relationship between anxiety and nicotine dependence has been shown to be significant (Feltes, 2005). Anxiety could have serious influence on adolescent smokers who are pregnant.

According to the literature, depression, anger and anxiety affect pregnancy and its outcomes, such as length of labor and complications, and also affect smoking; the higher the levels of altered moods, the higher the level of smoking. In a study of 166 pregnant women, Field (Field et al., 2003) found that depression, anger, and anxiety were confounded and suggested that interventions must target all three mood states. Further research is needed to evaluate these mood states in pregnant teen smokers.

1.2   PURPOSE AND SPECIFIC AIMS

Depression, anger and anxiety are often studied as negative mood states, and have been associated with adolescent pregnancy and smoking. To date, no research has explored the individual and combined effects of these mood states on smoking dependence behavior and smoking consumption in a pregnant, adolescent smoking population. The purpose of this research was to explore and predict smoking dependence behavior and smoking consumption by

examining the relationships of depression, anger and anxiety through secondary analysis of an existing data set comprised of pregnant adolescent smokers.

1.3   HYPOTHESES

Based on the literature and the variables available within an established data set, the following hypotheses were explored:

H1: Depression, anger and anxiety are mood states that are present in pregnant adolescents who smoke.

H2: Depression, anger and anxiety are inter-related.

H3: Depression, anger, and anxiety affect smoking dependent behavior of pregnant teens who began smoking prior to pregnancy.

H4: Depression, anger and anxiety affect smoking consumption of pregnant teens who smoke.

1.4   DEFINITION OF TERMS

This study is a secondary data analysis, thus the definitions of variables are consistent with those in the parent study "Nursing Intervention for Young Pregnant Smokers," Dr. Albrecht, Principal Investigator (PI).

Smoking dependence behavior is defined as the powerful drive to inhale nicotine from cigarettes that cannot be controlled (Fagerstrom, 2002) Smoking consumption can be defined in many ways such as how much nicotine is inhaled from the cigarette or how much of the cigarette is smoked. However, smoking consumption was defined as number of cigarettes smoked on a daily basis for this study.

To define depression, the classic definition was used: an overwhelming feeling of sadness exhibited by crying frequently, inability to engage in the activities of daily living, sleep disturbances, and relationship difficulties (Radloff, 1991).

Anger was defined as a feeling of: 1) being mad, 2) feeling frustrated, 3) feeling furious, or 4) having associated inappropriate temper behaviors or 5) violence (Spielberger, 1983).

Anxiety was defined as an altered mood state characterized by a feeling of being nervous, worrying too much, restlessness, being upset, or uneasy. Anxious persons are not calm, satisfied, happy, or secure (Spielberger, 1983).

Defined as such, depression, anger, and anxiety were evaluated in everyday life experiences of the subject and not defined as mood states in relationship to any smoking behaviors.

1.5   SIGNIFICANCE TO NURSING

When women become pregnant, they are more likely to quit or refrain from smoking during the pregnancy than at any other time in their lives (Ludman et al., 2000). Late adolescents and young adults, especially those who are pregnant, are at risk for altered mood states that could influence their smoking dependence behaviors and smoking consumption before and after the delivery of their infants. However, it is speculated that women who are depressed, stressed, or both, might be more likely to continue to smoke during their pregnancies. Therefore, given the detrimental effects of smoking before, during and after pregnancy, the changes occurring during adolescence and pregnancy, and the possible high level of depression, anger, and anxiety in teens, especially pregnant teens, the purpose of this research is to investigate the role of mood states and their effect on smoking dependence behaviors and smoking consumption during pregnancy. Understanding the independent and combined effects of these mood states on smoking dependence behavior and smoking consumption will provide a basis for future interventions to reduce smoking in pregnancy, and positively influence the health of the pregnant teen and her fetus/infant. In order to decrease smoking dependence behaviors and smoking consumption in adolescent mothers and to provide interventions for smoking cessation, it is critical to explore the relationships of mood states and their influence on smoking during pregnancy.

1.6   IMPLICATIONS

This project will add to the body of knowledge in this area of pregnant teenage smokers. The knowledge gained can contribute to efficient interventions for pregnant adolescent smokers, will contribute to the health of teens and their babies and encourage nurses to include psychological perspective and mood states in their assessments. The nurse and healthcare provider must offer counseling and support to encourage positive mood states and promote smoking cessation in all teens, but especially pregnant adolescents. This research incorporates depression, anger and anxiety in order to identify a model of smoking dependence behaviors and smoking consumption in this population, and hopefully, bridge gaps in the literature. As knowledge is gained regarding factors that influence smoking, the foundation for interventions can be built, the best care for mothers and babies can be ensured, and ultimately, the dangers of smoking on the health of mothers and babies can be reduced.

2.0   CHAPTER TWO

2.1   REVIEW OF RELATED LITERATURE

This chapter provides the basic rationale for and explains the significance of the study. Additionally, it will describe the gaps between the established literature that are addressed in this study. The major concepts related to smoking behavior and cessation in adolescent pregnant teens will be explored as follows.

The first section discusses prevalence of smoking in adolescents, and during pregnancy. This will be followed by a description of the smoking cessation intervention for pregnant teens from which the data for this analysis are derived. Although teens are often light smokers, the possibility of physical addiction to nicotine is present, and this process will be explained. Finally, a summary of the gaps between the previous empirical studies and the current study will be presented.

2.2   SMOKING IN ADOLESCENTS

Teen smoking rates fluctuate, but smoking is prevalent among adolescents and is a major health risk. Fagerstrom (Fagerstrom, 2002) documented that 17% of high school seniors smoked in 1992, but in 1995, the rate increased to 22%. Data from the 2001 Youth Risk Behavior Survey

documented a rate of 36.4% in 1997 with a decline to 28.5% in 2001, thus teen smoking is a major health problem (Prokhorov, Hudmon, & Stancic, 2003). Although nearly one third of high school students in the United States smoke cigarettes, 70% of 12 to 17 year-olds regret it, and 3 out of 4 have tried to quit and failed (Adelman, Duggan, Hauptman, & Joffe, 2001). Further, Moolchan (Moolchan, Ernst, & Henningfield, 2000) speculated that of students in grades 9-12 who have used tobacco, 75% of teenage smokers will smoke as adults. These data are alarming in that 80% of adults who smoke initiated smoking in their high school years (Coleman, 2004). Clark (Clark et al., 2005) stated that teens who smoke in high school will become regular smokers as adults. Surprisingly, Seguire (Seguire & Chalmers, 2000) used a qualitative study of current and former Canadian adolescent smokers and found that only 2 of the 25 subjects actually quit smoking. Smoking is globally prevalent and a serious health threat.

2.3   SMOKING IN PREGNANCY

Much of what is known about smoking in pregnancy is based on adult women. Bennett (Bennett, Einarson, Taddio, Koren, & Einarson, 2004) reported smoking in pregnant women as high as 20%. Coleman (Coleman, 2004) reported a figure as high as 25% in the United Kingdom. Delpisheh (Delpisheh, Attia, Drammond, & Brabin, 2006) stated that almost 50% of all teens in England smoked while pregnant in a study of 534 adolescents. In a sample of 145 pregnant adolescents, Kaiser (Kaiser & Hays, 2005) found that of the 52% (n = 75) who smoked early in pregnancy, 21% (n = 39) continued through pregnancy and did not quit. Health-risk behaviors were higher in the sample and are probably under-reported in teen populations (Kaiser & Hays, 2005).

2.4   SMOKING IN A SAMPLE OF PREGNANT ADOLESCENTS: PARENT STUDY

In her Pregnant Teen Fresh Start Nursing Intervention Study, Abrecht (Albrecht et al., 2006) found that a significant number of teens who received an educational intervention plus a support person "buddy" quit smoking during their pregnancies. One hundred, forty-two subjects who completed the study were randomized into one of three intervention groups, specifically, education, education plus support person and usual care. Those who received education and a person of their choosing to support them 24 hours a day had the best outcomes. Unfortunately, one year after the randomization, there were no differences in smoking behaviors. Although mood states were assessed, they were not included in the analysis of study aims, nor were they addressed in the intervention. This study used these previously obtained data to evaluate the relationship that mood states might have played with smoking dependence behaviors and smoking consumption, a possible critical component to failed cessation or relapse following cessation. Mood states may be altered in relation to the physical experiences of nicotine exposure, or may be a precursor to the adoption of smoking. These proposed mechanisms for the association of altered mood and smoking have been described in the literature.

2.5   SMOKING ADDICTION

Nicotine addiction is the compulsive use of tobacco that is associated with tolerance, dependence, and withdrawal (Department of Health and Human Services, 1988) Cigarettes and tobacco products contain nicotine. In lower concentrations (an average cigarette yields about 1 mg of absorbed nicotine), the substance acts as a stimulant in mammals and is one of the main factors responsible for the dependence-forming properties of tobacco smoking. As nicotine enters the body, it is distributed quickly through the bloodstream and can cross the blood-brain barrier. On average it takes about seven seconds for the substance to reach the brain when inhaled. The half life of nicotine in the body is around two hours (Benowitz & Jacob, 1994) The amount of nicotine inhaled with tobacco smoke is a fraction of the amount contained in the tobacco leaves (most of the substance is destroyed by the heat). The amount of nicotine absorbed by the body from smoking depends on many factors, including the type of tobacco, whether the smoke is inhaled, and whether a filter is used. Nicotine is metabolized in the liver by cytochrome P450 enzymes (mostly CYP2A6, and also by CYP2B6). A major metabolite is cotinine.

Nicotine acts on the nicotinic acetylcholine receptors. In small concentrations it increases the activity of these receptors, among other things leading to an increased flow of adrenaline, a stimulating hormone. The release of adrenaline causes an increase in heart rate, blood pressure and respiration, as well as higher glucose levels in the blood.

The sympathetic nervous system, acting via splanchnic nerves to the adrenal medulla, stimulates the release of epinephrine. Acetylcholine released by preganglionic sympathetic fibers of these nerves acts on nicotinic acetylcholine receptors, causing cell depolarization and an influx of calcium through voltage-gated calcium channels. Calcium triggers the exocytosis of

chromaffin granules and thus the release of epinephrine (and norepinephrine) into the bloodstream (Zaika, Pochynyuk, Kostyuk, Yavorskaya, & Lukyanetz, 2004).

In addition, nicotine increases dopamine levels in the reward circuits of the brain. Studies have shown that smoking tobacco inhibits monoamine oxidase (MAO), an enzyme responsible for breaking down monoaminergic neurotransmitters such as dopamine, in the brain. It is currently believed that nicotine by itself does not inhibit the production of monoamine oxidase (MAO), but that other ingredients in inhaled tobacco smoke are believed to be responsible for this activity. In this way, it generates feelings of pleasure, similar to that caused by cocaine and heroin, thus causing the addiction associated with the need to sustain high dopamine levels.

The earlier and greater exposure to nicotine, the stronger the addiction and, consequently, more receptors are developed (Glover, Glover, & Payne, 2003). When nicotine is bound to the receptors, dopamine and noradrenalin are released, providing feelings of elation, improved alertness and cognitive function (Glover, Glover, & Payne, 2003). Netter (Netter, Toll, Lujic, Reuter, & Hennig, 2002) confirmed that dopamine is released in the presence of nicotine and addiction is reinforced by this mechanism. Tobacco users become use to these feelings or mood states and this is the basis of addiction (Glover, Glover, & Payne, 2003). When users attempt to quit, withdrawal ensues and mood states are altered (Glover, Glover, & Payne, 2003). Tolerance occurs because receptors become desensitized, the effect of dopamine is lessened, uncontrollable craving is experienced, and the cycle of drug intake is re-established and may increase(Netter, Toll, Lujic, Reuter, & Hennig, 2002). Unfortunately, adolescents are the most susceptible to this phenomenon. Teens' brains become rewired earlier and faster, changing function and structure, and adolescents become addicted to nicotine stronger and earlier (Glover, Glover, & Payne, 2003).

Another consideration in nicotine addiction is the role of genetics. The rate of metabolism of nicotine likely influences the level of addiction. If an individual metabolizes nicotine quickly, they can become addicted quickly, the rate being determined by genetics (Glover, Glover, & Payne, 2003). If nicotine quickly leaves the body, the individual feels the need or craving to replenish levels, thus, addiction ensues.

The process of addiction is described differently in slow metabolizers. In a recent study, CYP2A6, a gene involved in drug metabolism, was assessed for a role in progressing to nicotine dependence in adolescents. The CYP2A6 gene encodes a hepatic enzyme that mediates the inactivation to cotinine. This pathway accounts for the removal of approximately 80% of the nicotine consumed. Of particular interest are the variants of this gene that influence the rate of metabolisms of nicotine to cotinine. Slow metabolizers are individuals who have less than 50% of the activity of normal metabolizers. This metabolic rate is believed to influence dependence. For example slower metabolizers smoke fewer cigarettes, and are less likely to present for formal smoking cessation treatment. Slow metabolizers are half as likely to be smokers in adulthood, and are more successful at quitting when using the nicotine patch. For a normal metabolizer to achieve the nicotine level of a slow metabolizer, the normal metabolizer must smoke more frequently, and thus more deeply ingrain the habit (Audrain-McGovern et al., 2007).

According to twin studies by White (White, 2003), genetics accounts for 50% of the variance in adult smokers and 35% of adolescent smokers, but the research is questionable and more studies are needed. In a study of 739 twin, adolescent, pairs, smoking was mostly influenced by common environment and choice of friends (White, 2003). Smoking, genetics, and environment are a serious and confounded issue that needs further study.

2.6   MOOD STATES AND ADDICTION

There are many mood states linked to health risk behavior, however, depression, anger and anxiety are more commonly noted. Depression has been associated with smoking in multiple ways. Bock (Bock, Goldstein, & Marcus, 1996) reported that depression can cause failure to quit smoking and smoking cessation can cause depression. Smoking elevates mood. Smoking cessation was linked to depressed mood, anxiety, irritability, anger, and fatigue (Bock, Goldstein, & Marcus, 1996) Smoking is involved in a viscous circle. Stress caused the subjects to smoke more and more smoking is the coping mechanism to decrease negative moods. As an outcome of a comprehensive review of the literature, Kassel and colleagues (Kassel, Stroud, & Paronis, 2003) reported that depression and smoking in adolescents are reciprocal. Depression causes increased smoking and increased smoking can cause depression. Fagerstrom (Fagerstrom, 2002) agreed that depression is a notable risk for nicotine addiction.

Morris (Morriss, 2005) found that depression has a direct effect on smoking progression, the higher the level of depression, the higher the level of smoking. Seguire (Seguire & Chalmers, 2000) in a qualitative study of 25 female teens, identified reasons for adolescent female smoking: bonding with peers, adult thing to do, someone in household smoked, gain control, fitting in and being cool. Adolescents reported that addiction felt like being in jail and stated that they would quit when they became pregnant (Seguire & Chalmers, 2000) Patton (Patton et al., 1996) in a cluster study of 2525 students, found teen smokers, particularly females, were twice as likely to have high levels of anxiety and depression. Goodman (Goodman & Capitman, 2000) agreed and found that females and non-white smokers had the highest levels of depression. Cornelius (Cornelius, Leech, & Goldschmidt, 2004) in a sample of 344 pregnant

teens, confirmed that persistent smokers had more aggressive problems and more substance abuse.

2.7 FACTORS ASSOCIATED WITH SMOKING IN PREGNANCY

There are many studies that have explored the factors associated with smoking in women. In large studies, such common factors as depressive symptoms, age of 20 or above, being unmarried, having less than a high school education, and living with other smokers contributed to smoking during pregnancy (Jesse, Walcott-McQuigg, Mariella, & Swanson, 2005; Kahn, Certain, & Whitaker, 2002; Orr, Newton, Tarwater, & Weismiller, 2005) Jesse (Jesse, Walcott-McQuigg, Mariella, & Swanson, 2005) also found that abuse, low social support, religiosity, substance abuse, and being of the White race predicted smoking in pregnancy.

Ludman (Ludman et al., 2000) reported similar findings. Younger, low income or unmarried women, or those having an unintended pregnancy, were associated with higher baseline stress. When such factors were assessed from the perspective of smoking cessation, lower levels of stress and depression were not predictive of smoking cessation later in pregnancy. Cornelius (Cornelius, Leech, & Goldschmidt, 2004) revealed that being white, poor, older, in a single parent home, engaging in binge drinking, having more friends that smoke, late menarche and early sexual promiscuity are predictors of smoking in pregnant teens. Interestingly, the parent study reported similar findings (Albrecht et al., 2006).

2.8   MEASURE OF NICOTINE DEPENDENCE

Nicotine dependence, thus, is both physiologic and psychologic. The assessment of nicotine dependence has been approached from a number of perspectives. Early studies assessed addiction by questioning the number of cigarettes smoked per day. These questions were later enhanced by adding such questions as the interval between cigarettes, situations that prompted smoking, and how soon after awakening did the smoker smoke a cigarette. Investigators initiated studies to develop instruments with established psychometric properties. The original scale, the Fagerstrom Tolerance Questionnaire (FTQ), (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) has 8 items to measure nicotine dependence or addiction. The FTQ was limited by weak psychometric properties, thus researchers worked to revise the instrument to improve the psychometrics. The Fagerstrom Test of Nicotine Dependence (FTND) by Heatherton (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) is a modification of the FTQ with only 6 items. Two of the original items were deleted because of poor psychometric performance. According to Chabrol, (Chabrol, Niezborala, Chastan, & de Leon, 2005) an FTND score equal or greater to 6 indicates nicotine dependence. The FTND has been used in various studies despite continued reports of low Cronbach's alphas, .61, .56, and .67. Investigators differ in their recommendations for improving the psychometric properties. Chabrol (Chabrol, Niezborala, Chastan, Montastruc, & Mullet, 2003) combined the first and second questions: "number of cigarettes per day" and "time of the first cigarette of the day" from the FTND and obtained an improved Cohen's kappa of .74. Richardson and Ratner (Richardson & Ratner, 2005) critically examined the FTND, and determined the instrument to be reflective of two factors. The first had to do with the urgency with which a person would smoke in the morning, in an attempt to restore nicotine levels to the usual level at which the person functions. The

second factor measures the smoking patterns, that is the frequency with which the person must smoke to sustain the nicotine. Richardson and Ratner, thus, judged the FTND to be multidimensionality and expressed concern that the simplistic, one-factor scoring will result in increased measurement error. Further, Richardson (Richardson & Ratner, 2005) suggested using a Likert scale for measurement to improve psychometrics, and proposed development of additional questions because of the complexity of measuring and defining nicotine dependence. Etter (Etter, Duc, & Perneger, 1999) reported that the FTND measures only one construct, that is the intake of nicotine to avoid withdrawal symptoms. Dijkstra and Tromp (Dijkstra & Tromp, 2002) argued that the FTND measures a physical addiction consistent with the Etter definition, and tested the FTND for use in detecting a psychological addiction, and as a basis for matching smokers to treatments on the basis of FTND scores. Clearly, nicotine addiction and smoking dependence behavior is a complex and challenging concept to define and measure. Past attempts to make the FTND shorter and more efficient have not resulted in a stronger instrument in terms of psychometrics.

These studies were undertaken in adults, and there is concern that addiction may be a different experience in the adolescent population. Clark (Clark et al., 2005) examined 301 daily-smoking adolescents, between the ages of 12 to 18 years, Clark reported that the FTND predicted cigarette use over time, and as such, should be included in a multidimensional assessment of nicotine dependence in teens. The other dimensions put forth by Clark include the Nicotine Dependence Syndrome Scale (NDSS) which has acceptable psychometric properties when applied to adolescents and an assessment of smoking. These three approaches provide for multidimensional smoking assessment. Although the literature is still inconsistent in terms of the best measure of addiction, this secondary analysis is limited to those measures that were included

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in the parent study, and thus, the FTND will be fully described. In addition, the number of cigarettes smoked will be reported as smoking consumption, and will be analyzed in relation to altered mood states.

Finally, there is concern that the FTND performs best in the condition of daily smoking of greater than 10 cigarettes With a sample of 643 smokers, Etter (Etter, Duc, & Perneger, 1999) compared the FTND and Heaviness of Smoking Index (HSI). In the case of light smokers, the FTND and HSI only measured the number of cigarettes smoked, and not addiction, raising questions about the validity of the tool in light smokers. Etter (Etter, Duc, & Perneger, 1999) also suggested an improved definition of smoking addiction. However, Etter (Etter, Duc, & Perneger, 1999) believed that the ease of administration of the FTND and the completeness of the data collected was an important advantage of the scale. Etter (Etter, Duc, & Perneger, 1999) also found that the FTND had good test-retest reliability at 2 weeks ($r = .88$) and that all items were correlated with saliva cotinine levels, indicating that the FTND does measure smoking levels. Kozlowski(Kozlowski, Porter, Orleans, Pope, & Heatherton, 1994) also found the HSI and FTND to perform similarily and that the FTND is superior to the FTQ.

Storr (Storr, Reboussin, & Anthony, 2005) utilized a sample of 962 smokers, ages 19 – 24, who were assessed for nicotine dependence by completing the FTND. Storr (Storr, Reboussin, & Anthony, 2005) found 66% of the sample participants to be light smokers. Using a new method to classify smokers, Latent Class Analysis (LCA), some light smokers were classified as having higher dependence levels (Storr, Reboussin, & Anthony, 2005) Storr (Storr, Reboussin, & Anthony, 2005) believed that the FTND, which was validated by biochemical measures, but has had criticized psychometrics, was a tool that should be used in epidemiological studies with new and established instruments. Storr (Storr, Reboussin, & Anthony, 2005) stated

that the FTND is an adequate tool using the established cut-points but the FTND does not assess all of the factors associated with tobacco dependence. Storr (Storr, Reboussin, & Anthony, 2005) believed that the FTND does not identify all cases of nicotine dependence and especially not those reflecting new DSM guidelines. Storr (Storr, Reboussin, & Anthony, 2005) also stated that light smokers might not be evaluated properly by the FTND.

2.9   DEPRESSION

Depression was defined as life against the pleasure principle, according to Beck (Beck, 1976). Because of this ideology, depression was seen as manifested in somatic, emotional, and psychological symptoms such as over or under-sleeping, eating problems, sexual disturbances, and difficulties in relationships. Parker (Parker & Roy, 2001) reported that anxiety, nervousness and neuroticism precede adolescent depression, irritability and anger are the manifestations of depression in teens and melancholia is rarely seen. Depression can be evident at any point during the lifespan and affects the whole person.

Depression is a common and widespread problem in America today. Fifty-seven percent of all teens have experienced some form of depression (Lerner, 2002). Lerner (Lerner, 2002) described depression as "internalizing" problems and notes that depression has effects on the mental, cognitive, and emotional functioning of the person. Thus, depression affects the whole person. Bennett (Bennett, Einarson, Taddio, Koren, & Einarson, 2004) reported depression in pregnancy as 20% and as high as 50% in low socioeconomic status levels of women.

2.10   DEPRESSION IN PREGNANT ADOLESCENTS

Szigethy (Szigethy & Ruiz, 2001) reported depression in pregnant adolescents as 16 to 44%. In a study by Troutman (Troutman & Cutrona, 1990) 6% of teens studied (n = 128) during pregnancy, 6 weeks postpartum and 1-year postpartum experienced major depression and 20% experienced minor depression. Troutman (Troutman & Cutrona, 1990) concluded that this was not significantly different from non-pregnant or postpartum adolescents. Piyasil (Piyasil, 1998) reported that teen mothers in Thailand had 23% depressive state as compared to 11.9% in the adult control subjects. Koniak-Griffin (Koniak-Griffin, Walker, & de Traversay, 1996) confirmed and reported that the majority of pregnant adolescents in the sample had a high level of depressive symptoms. The statistics may change but it is clear that pregnant adolescents are at high risk and appropriate identification, treatments and interventions are necessary because of the risk of poor outcomes. Prevention and early intervention is key.

Barnet (Barnet, Duggan, Devoe, & Burrell, 2002) stated that teenage girls that are pregnant often experience a repeat pregnancy and are at risk for depression, substance use and school drop out following delivery. Barnet (Barnet, Duggan, Devoe, & Burrell, 2002) proposed a study utilizing a home visitation by volunteers' intervention, with 232 postpartum participants. Barnet (Barnet, Duggan, Devoe, & Burrell, 2002) found that half of the subjects had poor mental health at baseline, using MHI-5, a short form of the RAND Mental Health Inventory, which is highly predictive of depressive disorders and has been validated and recommended for use with adolescents. This is alarmingly high. Unfortunately, the intervention made no difference in mental health. Support usually helps with depression, but not in Barnet's (Barnet, Duggan, Devoe, & Burrell, 2002) study. Barnet (Barnet, Duggan, Devoe, & Burrell, 2002) further hypothesized that children of teen mothers may suffer because of poor parenting and that the

adolescents are not referred to treatment, as professionals often fail to recognize depression in this age group and in this situation. Barnet (Barnet, Duggan, Devoe, & Burrell, 2002) suggested that there is a strong need for programs to identify depressed teens and then, enter them into effective treatment. Depression can be present before pregnancy, during pregnancy and during the postpartum period.

2.11   MEASUREMENT OF DEPRESSION

Koniak-Griffin (Koniak-Griffin, Walker, & de Traversay, 1996) utilized the Center for Epidemiological Studies Depression Scale (CES-D) and reported that a high level of depression symptoms was present in the majority of the 62 pregnant adolescents. Rojas (Rojas, Killen, Haydel, & Robinson, 1998) completed a study with 2197 10th graders using the FTQ and CES-D and identified 485 that smoked. Using correlations, Rojas (Rojas, Killen, Haydel, & Robinson, 1998) found significantly more females with higher scores on the CES-D who attempted to quit. Furthermore, Rojas (Rojas, Killen, Haydel, & Robinson, 1998) stated that depressive symptoms are difficult to compare since most of the research in this area has been done with adults and not teens. Goodman (Goodman & Capitman, 2000) in a study of 8704 teens that used the CES-D found that cigarette smoking was the strongest predictor of developing high levels of depressive symptoms and non-smokers with high depressive symptoms were 3 times more likely to become a heavy smoker in bivariate analysis. Zhu (Zhu & Valbo, 2002) in a study of 487 women, using the CES-D found that depressed smokers were less confident about quitting than the non-depressed. As previously mentioned, there is a reciprocal relationship between depression and smoking. Depression can increase smoking and smoking can increase depression.

Feltes (Feltes, 2006), in preliminary work utilized a meta-analysis of the related literature and found that depression is correlated with anxiety, r = .61. Depression and anxiety together could have serious influence and consequence in the target population.

2.12   ANGER

Ponirakis (Ponirakis, Susman, & Stifter, 1998) stated that anger has rarely been studied in adolescent pregnant populations. Anger has been correlated with poor outcomes in the few studies that have been completed. Ballinger (Ballinger, 1982) found that hostility, defined as anger turned inward, was correlated with anxiety in pregnancy. Cornelius (Cornelius, Leech, & Goldschmidt, 2004) studied 344 adolescent pregnant smokers and found that aggressive problems were related to persistent smokers. In a study of 120 adolescents De Anda (de Anda, 1992) utilized the State-Trait Anxiety Inventory (STAI) and found that those with high stress were unemployed and maladaptive with more substance abuse and aggression. Galambos (Galambos, Barker, & Krahn, 2006) studied 920 young adults, ages 18 – 25, followed longitudinally, assessed anger into emerging adulthood and found that anger is less as age advances. Galambos (Galambos, Barker, & Krahn, 2006) further indicated that there have not been any longitudinal studies evaluating anger of adolescents into adulthood. Jenkins (Jenkins, Shapka, & Sorenson, 2006) completed a study of 121 pregnant teens using the "How I Feel Scale" with an internal consistency of r = .88, and found that maternal anger was significantly related to her partner. More research must be completed to evaluate anger and fit a model of the role of anger in a sample of pregnant smoking teens. Anger could effect smoking and have serious influence and consequence in pregnant adolescents

2.13   MEASURE OF ANGER

The State-Trait Anger Inventory (STAXI) assessed anger. Subjects responded to 10 items for trait anger on a scale of 1 – 4, with a possible score of 40. Spielberger (Spielberger, 1996) reported the STAXI internal consistency reliability to be .82 to .90. Phillips (Phillips, Henry, Hosie, & Milne, 2006) utilized the STAXI-2 in a sample of 286 adults aged 18 – 88, and found that anger is less as age advances, older persons have less anger. Unfortunately, reliability of the scale was not reported for the sample.

2.14   ANXIETY

According to Lerner (Lerner, 2002), anxiety is common in adolescents, 12-20%.   Costello and Angold (Costello, 1995) completed a meta-analysis on 16 studies and reported anxiety in children ages 6 – 17 years to be 5.7 – 17.7%. Velting (Velting, 2004) agreed and confirmed that anxiety is high in the teen population. Lerner (Lerner, 2002) defined anxiety as an internalizing problem, directed to the person's mental, cognitive, and emotional self. It is an uncomfortable feeling that can escalate into palpitations, sweating, and nervousness. Speilberger (Spielberger & Smith, 1966) revealed that Cattell and Scheier (Cattell, 1961) actually developed the concepts of state anxiety and trait anxiety. Speilberger (Spielberger & Smith, 1966) explained that trait anxiety stems from persons viewing the world as dangerous or threatening and then, they respond with state anxiety reactions, right now. Spielberger (Spielberger & Smith, 1966) further revealed that when people are highly anxious, they "see their own ineptitude." Piyasil (Piyasil,

1998) reported that 15% of teen mothers had anxiety as compared to 12% of the adult, control mothers.

Feltes (Feltes, 2005) reported the Cronbach's alpha of the 10-item adapted version of the State-Trait Anxiety Inventory (STAI) indicated good internal consistency reliability (.79). Correlation results showed that regardless of intervention received there was a significant relationship between: total anxiety score and "smoking where/when prohibited" (p=.028); "upset" and "number of cigarettes smoked per day" (p=.05); "upset" and "ill in bed" (p=.01); "lack of confidence" and "smoking where/when prohibited" (p=.05); "not liking self" and "number of cigarettes smoked per day" (p=.05); and "worry" and "smoking upon awakening" (p=.05). Anxiety was related to smoking addiction (Feltes, 2005).

Ludman (Ludman et al., 2000) did research with a sample of graduated, married, white, and employed women. Hishinuma (Hishinuma, Miyamoto, Nishimura, & Nahulu, 2000) completed a study of 2946 high school students in Hawaii using the State/Trait Anxiety Inventory for Children (STAI-C) and found that females scored significantly higher than males. Little is known about anxiety in pregnant adolescents. No empirical evidence or studies can be found linking anxiety in pregnant teens to smoking behaviors. Therefore, more research is needed to further explore and add to this area of knowledge, and then to develop interventions for this population.

2.15   MEASURE OF ANXIETY

The STAI assessed anxiety. Subjects responded to 10 items for trait anxiety on a scale of 1 – 4, with a possible score of 40. Speilberger (Spielberger, 1983) reported reliability for the STAI for high school students to be .695.

2.16   MOOD STATES IN ADOLESCENT PREGNANCY

Altered or poor mood states do affect the mother/child bond (Trad, 1995) Trad (Trad, 1995) further revealed that these adolescent mothers need all encompassing interventions that address the developmental status of the teen since emotions are not well controlled and mood states are altered. Development of the teen and altered mood states is of great significance in pregnancy. Only one study, Ponirakis (Ponirakis, Susman, & Stifter, 1998) evaluated depression anger, and anxiety in pregnant adolescents. In this study of 27, less cardiac vagal tone was detected in the babies of mothers with negative mood states. Negative mood states of the mother do have consequences for the infant. Therefore, given the implications of smoking, mood states, and adolescents, in pregnancy, more research is critical in this arena.

2.17   FUNCTIONAL THEORY

Based on the review of the literature, this research is based on the following model.
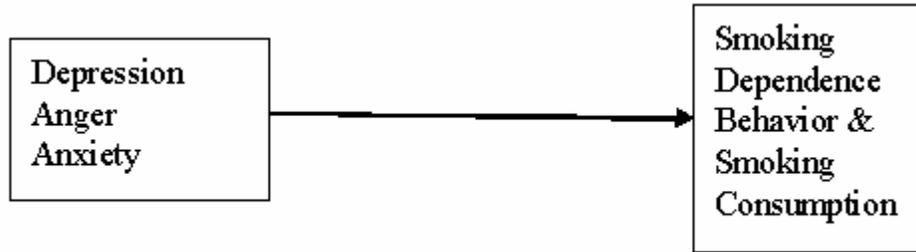
Figure 1: Conceptual model of the independent and dependent variables for the study

2.18   SUMMARY AND GAPS IN THE LITERATURE

Ponirakis (Ponirakis, Susman, & Stifter, 1998) found that depression, anxiety, anger, and hostility have negative consequences for infant outcomes. Field (Field et al., 2003) stated that depression, anger and anxiety are confounded. If a client has one trait, other traits are usually present. Ludman (Ludman et al., 2000) revealed that stress and depressive symptoms are highly correlated but not predictive. Other studies have found that anxiety and depression are predictive of smoking addiction.   The research is not always consistent.   No research has been done combining these variables, mood states, and assessing their effect on smoking dependence behavior and smoking consumption in a teen population. Most of the studies done in this arena have incorporated a sample of white, married, adult, and smokers. This research will evaluate these mood states in a pregnant,teen population and will evaluate their effect on the smoking dependence behavior and smoking consumption of the participants.

3.0   CHAPTER THREE

3.1   RESEARCH DESIGN AND METHODS

3.2   OVERVIEW

This chapter described the design of the proposed study, sample, setting, data collection procedures, protection of human subjects, instruments, data management and analysis.   This study explored the relationship of depression, anger, and anxiety to smoking dependence behaviors and smoking consumption in pregnant teens who smoked. Data were obtained from the study, "Nursing Intervention for Young Pregnant Smokers," Dr. Albrecht, Principal Investigator (PI) to perform a secondary analysis of existing baseline data.   The independent variables were depression, anger, and anxiety, and the dependent variables were smoking dependence behavior and smoking consumption.

3.3   OVERVIEW OF RESEARCH DESIGN

This study utilized a secondary data analysis of baseline data to evaluate mood states and smoking dependence behaviors and smoking consumption before treatment effects were in place and to prevent confounding. Secondary data analysis was chosen because of the available data

from the parent study and the appropriateness of the data to answer the research questions. Secondary data analysis is efficient and cost-effective. The data were rich in information that was of interest to the researcher. Data were obtained from the longitudinal, pre and post intervention, repeated measures study, "Nursing Intervention for Young Pregnant Smokers" (PI: S. Albrecht, RO1 NR 03233). In the parent study, the sample was recruited from large, teaching facilities and their obstetrical clinics, middle schools, senior highs, and alternative schools in the greater Pittsburgh area. Most subjects were recruited from the teen obstetrical clinic at Magee Womens Hospital. The subjects were from the surrounding urban area and recruited during their pregnancy. All participants were smoking at the time of recruitment and enrollment. The inclusion criteria were: 14-19 years old, 12-28 weeks pregnant, confirmed pregnant with a positive blood test and dating, English speaking, single, smoking at least one cigarette a day, childless, and accessible by phone. Subjects were excluded if they were: diagnosed with complications or placed on home study and confinement. Four hundred seventy pregnant teens were identified as potential subjects for the study. Of those, 224 met the inclusion/exclusion criteria and 142 consented to participate in the study.

Subjects for this analysis were selected on the basis of complete data for the variables of interest at the baseline assessment in the parent study. Missing data were assessed using SPSS frequencies and found to be extreme. Futhermore, SPSS eliminated missing data when the statistical analysis was performed. Dillman (Dillman, 2000) reported that in survey research, missing data is a common occurrence and must be handled appropriately. Adolescents typically have increased missing data in social survey research, many being lost to follow-up (Shiffman, 1993). In the parent study, multiple attempts were made to ensure continuation and completion

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of each subject in the research. However, drop-out and missing data were problematic. For this secondary analysis, 108 subjects were identified.

3.4   VARIABLES/MEASURES AND LEVEL OF MEASUREMENT

Instruments employed in this study were a demographic questionnaire, Modified State/Trait Anxiety Inventory (STAI) that evaluated anxiety, Modified State/Trait Anger Expression Inventory (STAXI) that evaluated anger, the Modified Center for Epidemiological Studies Depression Scale (CES-D) which measured depression, and Fagerstrom Tolerance Nicotine Dependence Test (FTND) which measured smoking dependence behavior. Smoking consumption was measured by the question "average number of cigarettes per day."

3.5   DEMOGRAPHIC DATA

Demographic data requested of the participants in the parent study were varied personal characteristics, such as age, race, gestational age, and number of smokers in the household of the participant.

3.6   DEPRESSION

In the parent study, depression was measured by 20 items from the CES-D, using a 0 to 3-response scale, with a score of 16 being indicative of depressive symptoms and the possible

range of scores being 0 to 60. The CES-D by Radloff (Radloff, 1991) has acceptable reliability across demographic characteristics (Field et al., 2003). Weisner (Wiesner, 2006)in a study with 724 adolescents found the CES-D to have internal consistency reliability of .91. CES-D was reworded in the parent study by consultation of experts for these adolescents for ease in reading; however, the scale was not tested for psychometric properties in this sample in the parent study.

3.7 ANGER AND ANXIETY

The State Trait Anger Expression Inventory (STAXI) assessed anger. Subjects responded to 10 items for trait anger on a scale of 1 – 4, with a possible maximum score of 40. Spielberger (Spielberger, 1996) reported the STAXI internal consistency reliability to be .82 to .90. STAXI was reworded in the parent study by consultation of experts for these adolescents for ease in reading; however, the scale was not tested for psychometric properties in this sample in the parent sample.

The STAI assessed anxiety. Subjects responded to 10 items for trait anxiety on a scale of 1 – 4, with a possible maximum score of 40. Reliability for the Modified STAI was found to be .79 in this sample (Feltes, 2005). Spielberger (Spielberger, 1983) reported reliability for the STAI for high school students to be .695. STAI was reworded for these adolescents for ease in reading. Also, only 10 items of the original 20 items of the scale by Spielberger (Spielberger, 1983) were utilized. This instrument was piloted in the parent study and only included 10 of the 20 items in order to decrease subject burden.

Higher values reflected higher levels of trait anger or trait anxiety. State anger or state anxiety was not measured. The independent variables were depression, anger, and anxiety.

3.8   SMOKING

The dependent variables, used separately, were the smoking dependence behavior and smoking consumption of the young, pregnant smokers. The FTND was used to determine the level of dependence to nicotine. This instrument is a self - report measure in which subjects responded to 6 questions by rating responses from 0 to 3 for two of the questions and "yes/no" for four of the questions. The answers were coded and summed, higher values indicating higher dependence to nicotine, with a possible score of 0 to 10. The cut-off score for nicotine dependence is greater than or equal to 6 (Bennett, Einarson, Taddio, Koren, & Einarson, 2004). The FTND has a chronbach alpha = .70 which is acceptable, based on a sample of 643 male and female smokers (Etter, Duc, & Perneger, 1999). However, Braxter (Braxter, 2003) found that the FTND only had a .26 reliability in African Americans and .55 in White adolescents. Unfortunately, the FTND has had questionable reliability. Therefore, further research is needed to evaluate the FTND with diverse samples, especially pregnant adolescent smokers. To assess smoking consumption, the daily number of cigarettes smoked as reported by the participant was utilized.

Coefficient alphas were performed for each of the tools used in this study. The results are as follows: Modified CES-D = .79, Modified STAXI = .87, Modified STAI = .79, and FTND = .51. The instruments used in the parent grant and in this secondary data analysis have shown acceptable to excellent reliability.

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3.9   HUMAN SUBJECTS

There were no known risks for the subjects of this study, as it was a secondary data analysis. This study was deemed as "exempt" from Human Subjects Concerns in a review by the University of Pittsburgh Institutional Review Board (See Appendix A). The parent study only involved minimal risk, non-invasive biological measures and surveys were completed.

3.10   PREPARATION FOR DATA ANALYSIS

For each respondent, scores were tabulated for each of the measures employed in the study. Measures of central tendency and dispersion of data were assessed for the independent variables, depression, anger, and anxiety to assess for accuracy and completeness.

This same procedure was accomplished for the subjects in this analysis with regard to the measures of smoking dependence behavior and smoking consumption. The FTND score was summated from the 6 items in the scale by rating responses from 0 to 3 for two of the questions and "yes/no" for four of the questions, with a possible score of 0 to 10. The number of cigarettes smoked per day assessed smoking consumption.

3.11   OUTLIERS

Histograms and frequencies were evaluated for all variables using SPSS.   From visual inspection, no outliers were identified. Scatterplots of the residuals were also evaluated and no

outliers were found, except in the depression data, in which 2 outliers were found. However, no change was made to the data to preserve accuracy of the data set.

3.12   ASSUMPTIONS

Assumptions were evaluated and verified using SPSS frequencies and graphs. Regression is robust to the assumptions and only gross violations must be corrected (Tabachnick, 2001). Therefore, this research has maintained the original data set for the most accurate interpretation. No data has been changed, no transformations were utilized, but all variables have been carefully screened and assessed.

3.13   INDEPENDENCE

All data are independent; no cases had relatives or spouses consented in the study. According to Huck (Huck, 2004), independence is an assumption that the groups did not interact with each other. Independence was not violated in that this project used baseline data; there were no group or intervention interactions at baseline.

3.14   HOMOSCEDASTICITY

Homoscedasticity is not an assumption in regression analysis, but was assessed in this evaluation of the data and adds to the strength of the analysis (Kleinbaum, 1998). Variance and range of the

variables were large and equal. The data was spread. However, the residuals had variability and normality was found in the analysis.   Therefore, the relationships of the variances of the variables were found to be homoscedastic.

3.15   LINEARITY

All scatterplots of the residuals were visually inspected. No curvilinear or non-linear patterns were found. The Normal P-P Plot of Regression Standardized Residual was examined. The data do assume a linear relationship.

3.16   NORMALITY

All variables were assessed to be normally distributed or approached normality by visually inspecting all histograms and scatterplots for all variables. The Normal P-P Plot of Regression Standardized Residual was examined. The points clustered around the horizontal line through "0" and there was no pattern. The sample is from a normal distribution and the points fall on a straight line. No data was changed to improve skewness or kurtosis, even though depression data exhibited higher skewness, -.699, and kurtosis, 1.399. Only 2 outliers were found in the depression data. Regression is robust to the assumptions (Tabachnick, 2001). Therefore, the data remained unchanged to provide the most accurate analysis and interpretations.

3.17   MISSING DATA

In the analysis of the 142 consenting subjects, anger had 17 incomplete cases, anxiety 7, depression 18, and FTND 15. Therefore, the summation of the scores was done, using SPSS, to eliminate all missing data, based on the outcome variable, FTND. SPSS used the N of 108, the most accurate and complete procedure (Zullo, 2006). This sample size was obtained using the summation function and placing "+" between each item, for each variable. FTND was already totaled in the dataset by an honest broker. Only complete and valid cases were utilized; no cases with missing data were considered.   SPSS did not use the entire sample of 142 subjects since they were not complete and valid cases. No imputation of the mean was done since that is not as accurate as using the 108 complete and valid cases. Unfortunately, in a secondary data analysis, the data is what it is and cannot be changed; data cannot be re-collected or instruments cannot be changed or added. Therefore, the highest accuracy of the data was maintained throughout the analysis as seen in the measures of central tendency previously described. There is no missing data for any of the independent variables nor is there any missing data for the dependent variables.

3.18   DATA ANALYSIS PROCEDURES

After screening of the data and verifying the assumptions, descriptive statistics, correlational analysis, multiple regression, and, hierarchical multiple regression were performed and the relationships assessed to answer the research questions.   All variables are continuous and

interval. Therefore, correlation, regression, and hierarchical multiple regression were appropriate approaches for the analysis.

4.0   CHAPTER FOUR

4.1   RESULTS

In chapter four, sample characteristics, answer to each of the primary hypotheses for the study, an exploratory analysis of a concept, self-efficacy, and a summary of findings are presented. The purpose of this research was to explore and predict smoking dependence behaviors and smoking consumption by examining the relationships of depression, anger, and anxiety through secondary analysis of an existing data set in a sample of pregnant, adolescent smokers. It was hypothesized that mood states are present, inter-related and affect smoking in the sample of pregnant, adolescent smokers.

4.2   SAMPLE

The sample for this study was a subset from the study "Nursing Intervention for Young Pregnant Smokers" (Principle Investigator: S. Albrecht, RO1 NR 03233). The subset was selected by virtue of having complete data on the variables of interest, namely depression, anger, anxiety, smoking dependence behavior, and smoking consumption. Using SPSS frequencies, a detailed descriptive analysis was performed on the sample of complete and valid cases (N= 108). The sample of 108 was assessed for representativeness of the total possible sample from the parent

study (N = 142). Table 1 shows the demographics of the sample from the parent study as compared to the demographics of the present study.

Table 1: Demographics

	N=142	N=108
Race		
Caucasian	49%	46%
African American	39%	44%
Age (Mean ± SD)	17 ± 1.3	16.9 ± 1.3
Gestational Age in Weeks	19 ±7.2	19.6 ± 6.6
Number in household	3 ±3.0	3.4 ±2.8
Number of smokers in household	2 ±2.3	2.3 ±2.4

The sample of 108 reflected the demographics in the original sample of 142 almost exactly. Participants (N= 108) had a mean age of 17 years, mean gestational age of 20 weeks, 46% were

White and 44% were African American. On average, of 3 in the household of the 108 teens, 2 were smokers. A chi-square was completed for the race of the participants. The differences between the original 142 and sample of 108 are not significantly different by race (p = .84). The study sample of 108 complete and valid cases is not different from the 142 consented subjects.

4.3   DESCRIPTIVES OF THE VARIABLES

The Center for Epidemiological Studies for Depression (CES-D) measure was used to measure depression in the parent study participants at the baseline interview. For each of the 20 items, subjects were asked to respond to questions by rating responses to statements as 0 to 3, with a possible score of 60. The mean score obtained in this study was 29.0, with a range of 0 to 46. CES-D was reworded upon recommendation of expert consultation, for ease in reading.

Anger was measured by the State-Trait Anger Expression Inventory (STAXI). Subjects responded to 10 items for trait anger on a scale of 1 to 4, with a possible score of 40. The mean score for anger was 22.0 and the range was 10 to38. STAXI was reworded upon recommendation of expert consultation, for ease in reading.

Anxiety was measured by the State-Trait Anxiety Inventory (STAI). Subjects responded to 10 items for trait anxiety on a scale of 1 to4, with a possible score of 40. The mean score for anxiety was 20.2 and the range was 10 to 33. STAI was reworded for these adolescents for ease in reading. Also, only 10 items of the original 20 items of the scale by Spielberger (Spielberger, 1983) were utilized to ease subject burden.

Smoking dependence behavior was measured by the Fagerstrom Test for Nicotine Dependence (FTND). Subjects responded to 6 items, by rating responses from 0 to 3 for two of

the questions and "yes/no" for four of the questions, with a possible score of 0 to 10. The mean

score for the FTND was 3.6 and the range was 0 to 8. The FTND was not modified in the parent

study. The median and mode are the same, 4, and are about the mean reflecting a normal

distribution. The data were not spread. The range, variance, and standard deviation were not

large. The subjects had scores between 0 and 8. Table 2 shows the descriptive statistics for the

FTND, the measure of smoking dependence behavior.

Table 2: Measures of Central Tendency and Dispersion for FTND

Mean	Median	Mode	Std. Deviation	Variance	Range
3.6	4.0	4.0	1.8	3.4	8.0

The number of cigarettes smoked per day measured smoking consumption. The mean

was 7.1 and the range was 1 to 20. Table 3 shows the descriptives for cigarettes smoked per day.

Table 3: Measures of Central Tendency and Dispersion for Cigarettes Smoked per Day

Mean	Median	Mode	Std. Deviation	Variance	Range
7.1	6.0	10.0	4.6	21.0	19.0

Correlations were run on the subjects' gestational age, age, and, mood states to further describe the sample. Unfortunately, there were missing cases for age (N = 103, missing = 5) and gestational age (N = 102, missing = 6). There were no significant correlations between gestational age and any other variable. However, there was a significant negative correlation between age of the participant and anger (r = -.32, p = .001). The younger the participant, the greater the anger.

4.4   STATISTICAL ANALYSIS OF THE HYPOTHESES

There are 4 hypotheses generated for the purposes of this study. The results are reported for each hypothesis.

H1: Depression, anger, and anxiety are mood states that are present in pregnant adolescents who smoke. Table 4 shows the results of the descriptive statistics for the mood states.

Table 4: Measures of Central Tendency for the Independent Variables

	Mean ± Standard Deviation	Median	Mode	Variance	Range
Depression	29.0 ± 7.9	29.0	29.0	61.8	46.0
Anger	22.0 ± 6.3	21.0	29.0	39.8	28.0
Anxiety	20.2 ± 4.8	20.0	17.0	22.6	23.0

The medians and modes are about the mean, reflecting a distribution approaching normality, not skewed. The data are spread given the large values of the range, standard deviation, and variance.

The cut-point for depressive symptoms is 16 (Bennett, Einarson, Taddio, Koren, & Einarson, 2004) and the mean for depression in this sample is 29.0. Using frequencies for the depression data, 93% of the sample scores are equal to or over the cut-off of 16. The hypothesis is realized for this variable. Depression is present in the sample.

In normative data, the mean for anger is 18.1 (Reyes, Meininger, Liehr, Chan, & Mueller, 2003). In this sample, the mean is 22.4. Using a t-test, this sample mean is significantly higher than the population mean. Examining the frequencies of the anger data revealed that 73% of the sample had a score above the normative mean score. The hypothesis is realized for this variable. Anger is present in this sample.

In normative data, the mean for trait anxiety in female high school students is 41.0 (Spielberger, 1983). In this sample, the mean is 20.2. There is inconsistency between the number of items in the original scale of 20 items and the parent study utilizing 10 items.

Therefore, the comparative norm for this sample would be approximately 20. However, examining frequencies of the anxiety data, 49% of the sample has a score above the mean. The hypothesis is realized. Anxiety is present in this sample.

H2: Depression, anger, and, anxiety are inter-related.

To answer this question, correlational analysis was utilized. Table 5 shows the correlation matrix for the variables.

Table 5: Correlation Matrix for the Independent Variables

	Anger	Anxiety
Depression	.39**	.55**
Anger		.40**

** Correlation is less than the $p = 0.01$ level (2-tailed).

H3: Depression, anger, and anxiety affect smoking dependent behavior of pregnant teens who began smoking prior to pregnancy.

Depression, anger, and anxiety were entered into the model together and as the independent variables, with the FTND being the dependent variable. The results were not statistically significant ($p = .842$, $F = .277$). Little variance was explained as $R^2 = .008$, thus, less than 1%. Table 6 shows the model for the regression.

Table 6: Multiple Regression for Smoking Dependence Behavior

Variables	b	p
Depression	025	.836
Anger	.083	449
Anxiety	-.015	.903

H4: Depression, anger, and anxiety affect smoking consumption of pregnant teens who smoke.

To answer this research question, multiple regression, was then performed on the baseline data (before the intervention) from the sample using SPSS Regression. Depression, anger, and anxiety were entered into the model together and as the independent variables, with smoking consumption or number of daily cigarettes as the dependent variable. The results were not

statistically significant (p = .880, F = .224). The variance was not explained as R2 = .006. Table

7 shows the model for the regression.

Table 7: Multiple Regression for Number of Cigarettes per Day

Variables	b	p
Depression	.005	.965
Anger	-.073	.506
Anxiety	-.019	.874

4.5   EXPLORATORY ANALYSIS: SELF EFFICACY

Given the notable presence of depression, anger, and anxiety in the sample of pregnant, smoking

adolescents, the insignificant findings were perplexing. A study by King (King, 1996) revealed

that depression in American youth is associated with decreased feelings of self-attractiveness and

decreased perceived social acceptance as well as problems with behavior. Szigethy (Szigethy &

Ruiz, 2001) reported that depression in adolescents is manifested by: poor self-concept, passive

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coping, cognitive distortions, and lack of control. Depression involves the whole person and causes upheaval in their entire world In contrast, Sargent (Sargent, Mott, & Stevens, 1998) studied teens to examine factors associated with cessation of smoking, and reported that a definite intent to quit predicts cessation, but only among occasional smokers. In the parent study, this concept was measured by asking the participant if she believed that she could quit smoking in a day or in one year from baseline. This question was posed as a part of the Confidence Scale by Velicer (Velicer, Diclemente, Rossi, & Prochaska, 1990), a 6 item questionnaire that measures the concept of self-efficacy.

Self-efficacy was defined as the belief of the subject that she was able to quit smoking for a specified period of time. Therefore, high self-efficacy would reflect lower dependence. The Confidence Scale presents 6 items that require a response on a 1 to 4 scale. The instrument has strong psychometrics, with a Coeffecient Alpha reported as .92 to .99   As Sargent and colleagues found this "will to quit" to be such an important factor in cessation, the concept of self-efficacy was explored for its contribution to smoking dependence behavior and smoking consumption. Table 8 shows the descriptives for self-efficacy.

Table 8: Measures of Central Tendency and Dispersion for Self-efficacy

Mean	Median	Mode	Std. Deviation	Variance	Range
15.7	15.0	17.0	4.7	21.0	17.0

Hierarchical Multiple Regression was then performed on the baseline data (before the intervention) from the sample using SPSS Regression to determine the effect of self-efficacy on smoking dependence behaviors. Depression, anger, and anxiety were entered into the model together, then, self-efficacy was entered. The mood states and self-efficacy were the independent variables and the FTND was the dependent variable. Self-efficacy was found to have a significant inverse association with smoking dependence behavior (p = .006), but not with smoking consumption. The variance was explained as R^2 = .079 or 8%. Table 9 shows the model for the regression.

Table 9: : Heirarchical Multiple Regression

Variables	b	p
Depression	.048	.684
Anger	.041	.705
Anxiety	-.097	423
Self-Effiacy	-.282	.006

4.6   SUMMARY OF FINDINGS

In this study, the hypothesized variables of depression, anger and anxiety were present in pregnant adolescents who enrolled in a smoking cessation study, and were inter-related. These variables, however, were not associated with smoking dependence behavior or smoking consumption. In contrast, an exploratory analysis of the concept of self-efficacy found that self-efficacy was inversely associated with smoking dependence behavior. Self-efficacy was the only variable that contributed to smoking dependence behavior and only explained 8% of the variance.

5.0   CHAPTER FIVE

5.1   DISCUSSION

This study was a secondary data analysis from a longitudinal study, "Nursing Intervention for Young Pregnant Smokers" (Principle Investigator: S. Albrecht, RO1 NR 03233). The data were collected starting in 1996 and completed in 2001. The data cannot be changed or clarified. The data were rich and provided the answers to the research hypothesis. The hypotheses were as follows and showed the following results:

H1: Depression, anger, and, anxiety are mood states that are present in pregnant adolescents who smoke.

This hypothesis was realized; altered mood states of depression, anger, and anxiety were present in the participants.

H2: Depression, anger, and anxiety are inter-related.

This hypothesis was realized; the altered mood states were inter-related.

H3: Depression, anger, and anxiety affect smoking dependent behavior of pregnant teens who began smoking prior to pregnancy.

This hypothesis was not realized; the altered mood states did not affect smoking dependent behaviors of the participants.

H4: Depression, anger, and anxiety affect smoking consumption of pregnant teens who smoke.

This hypothesis was not realized; the altered mood states did not effect the smoking consumption of the participants.

5.2 EVALUATION OF THE SECONDARY DATA ANALYSIS STRATEGY

The use of secondary data analysis was cost-effective and a time-efficient means of testing the study hypotheses. As questions regarding altered mood are sometimes difficult for study participants to respond to, this approach allowed for a study of these mood states without initiating a primary data collection. However, data could not be altered or added to strengthen the analysis or the study itself. During the time of data collection, each subject's questionnaires were reviewed for clarity and completeness. However, the data still contained missing items. Subject dropout was also of concern. During the parent study, attempts were made to contact every subject multiple times. Adolescents are difficult to study because of dropout and incomplete data. Secondary analysis has its challenges and benefits.

Adolescents are in a state of change and turmoil. Altered mood states, present in adolescents and in this sample, can affect their developmental processes and their problem behaviors, especially smoking (Boyles, 2007; Donovan, Jessor, & Costa, 1988). There are multiple reasons for an effort to measure and evaluate these concepts. Pregnancy in adolescence is still considered taboo and can affect the teens' social support network. Pregnant adolescents are at higher risk for altered mood states. Adolescence, altered mood states, pregnancy, and problem behavior in combination can be overwhelming for the teen and her family. Consequently, it is not surprising that the participants have extreme missing data and subject dropout. Some investigators have been successful in minimizing such dropout. Faulkner

(Faulkner & Merritt, 1998) completed a study of 10,645 teens, and reported 10.8% missing data. Faulkner (Faulkner & Merritt, 1998) stated that the results were not affected. In this study, because of the extreme amount of missing data, the analysis utilized only complete and valid cases (N = 108). This method strengthened the analysis. Future analysis, for instance, could employ different methods such as imputing the mean for each missing item.

5.3   SAMPLE

This sample of adolescents had a mean age of 17 years. This age is within the developmentally appropriate range of ages for adolescents (Lerner, 2002). Unfortunately, most of the research concerning mood states and smoking in pregnancy involve adult women. Further, studies conducted in teens vary in terms of the age of inclusion. More research is needed with samples of pregnant adolescent smokers.

The sample from this study did reflect the population and city statistics. The sample is representative of the women enrolled in the prenatal clinics at the primary data collection site, 50% white and 50% African American Unfortunately, many studies that have been done in this arena have been with all white, married women and not with a diverse sample of teens. Ludman (Ludman et al., 2000) and Heron (Heron, O'Connor, Evans, Golding, & Glover, 2004) utilized very large samples, in their studies of pregnant smokers, but the women were white and married. Further research should incorporate diverse samples of pregnant teens who smoke. Jesse (Jesse, Graham, & Swanson, 2006) used a sample (N = 130) consisting of 62% African American pregnant women smokers. The ratio of racial diversity was comparable to this project. Surprisingly, this study found that gestational age was not correlated to any other variable. In

most research involving pregnant women, groups are often formed by gestational age or trimesters because of the correlation of time pregnant and outcomes. This was not the case in this study. This procedure might not be necessary in future studies of teens.

This study found an inverse relationship between age of the subject and anger. A possible explanation could be that younger teens are angrier about the pregnancy, or have limited coping mechanisms for situations outside their control. However, no data was collected to determine the reason for the anger. Future studies should investigate this finding.

5.4   MOOD STATES

This study supported the literature and confirms the findings of many studies: depression, anger, and anxiety were found to be significantly correlated. This finding supported the findings of Field (Field et al., 2003) who found that mood states are confounded. Ludman (Ludman et al., 2000) further supported the correlation of the variables of stress and depression. Little (Little et al., 1982) found that hostility and anxiety are significantly correlated. Throughout this literature, unfortunately, the terminology and definitions for anger, hostility, and aggression are somewhat consistent. The terms of anger and hostility are also interchanged, as well as, the terms of stress and anxiety are interchanged. Clearer definitions should be provided and consistent measures used in individual studies. From the literature and in this study, evidence was found in that these variables are correlated and should be analyzed together.

5.5   MOOD STATES AND EFFECT ON SMOKING

Based upon the review of the literature, the variables of the mood states, depression, anger, and anxiety were selected and entered into the analysis together.   Hypotheses were formulated and the variables were thought to be predictive of smoking dependence behavior and smoking consumption. The hypotheses were not supported. The findings contradicted the literature. Kassel (Kassel, Stroud, & Paronis, 2003)reported that mood states such as stress, anger, anxiety, and sadness do increase cigarette consumption in adult smokers. The reason that the null hypothesis was not rejected in this study could be because of the data. The data for depression especially was skewed, had kurtosis, and contained 2 outliers. Also, the participants exhibited little variance in their depression scores, 93% were above the cut-off for depression symptoms. The analysis was re-run without the outliers, but the same results were obtained. Future research should incorporate transformations to normalize the distribution and eliminate outliers so that a model could be fit. Another reason that this hypothesis was not supported could be that the model for mood states and smoking in teens is different than adults. As previously mentioned, most of the studies completed in this arena are of pregnant women and not teens. Kassel (Kassel, Stroud, & Paronis, 2003) supported this explanation, reporting that adolescents are different in their initiation of smoking as related to negative moods. Negative moods differentiate between light and dependent smokers and there are mediators and moderators that are a part of this model. The model being a complex one, necessitates future research for development in prospective studies (Kassel, Stroud, & Paronis, 2003)

5.6   DEPRESSION

The mean score of 29 for the depression data was very high. The cut-off indicating depressive symptoms was >16. Depressive symptomotology was present in this sample with a mean well above the cut-off point. Referral to a primary care provider is unknown for the parent study. Future research must score variables in preliminary analysis so that appropriate referrals can be made. A possible explanation of this high level of depression could be that the subjects are pregnant and smoking and are experiencing the changes and turmoil of adolescence. Also, the Center for Epidemiological Studies for Depression (CES-D) was modified for age appropriateness and ease of reading and could have effected validity. Given this high level of depression and the literature indicating that the most influential mood state in smoking dependence behavior is depression, it was surprising that depression did not predict smoking dependence behavior. In contrast, Moolchan (Moolchan, Ernst, & Henningfield, 2000) found that depression and anxiety did affect smoking and Orr (Orr, Newton, Tarwater, & Weismiller, 2005) reported a strong positive relationship between smoking.   This study stands in contradiction to other studies, (Bock, Goldstein, & Marcus, 1996; Jesse, Walcott-McQuigg, Mariella, & Swanson, 2005; Kahn, Certain, & Whitaker, 2002) and found that depression is related to smoking and substance abuse. However, the participant may be depressed most of the time, but not about smoking. Shiffman (Shiffman, 1993) proposed that more research must be done to identify when the patient is depressed and not smoking in order to establish the relationship or absence of the relationship of the two variables. The mood state of depression has been studied the most in this arena. Kassel(Kassel, Stroud, & Paronis, 2003) proposed that most studies have focused on depression, not anger or anxiety, and given that depression is correlated with anger and anxiety, more research is needed to incorporate all three of these mood

states. Again, the depression data was not ideal. Future analysis should incorporate transformations.

5.7 ANGER AND ANXIETY

The State/Trait Anxiety Inventory (STAI) was modified and was not administered as recommended by Spielberger (Spielberger, 1983) which might have altered the reliability and validity. This instrument should be administered twice in immediate repetition, once for "state" and then, "trait." Spielberger (Spielberger, 1983) only provides normative data for the measurement of both state and trait anxiety. Therefore, it was very difficult to interpret the results of the anxiety data in this sample. Anxiety was found to be present in the sample, but again, it is not known if referrals were made. Approximate norms had to be established given the participants only completed 10 items for anxiety. Only 10 items were used to ease subject burden. The original instrument contained 20 items whereas the parent study only used 10 items. The subjects in this sample were only measured once for trait anxiety. Because this study was a secondary analysis, the changes cannot be incorporated; the data cannot be re-collected under different conditions or methods. However, the STAI was evaluated in preliminary work and was found to have acceptable reliability in this sample, r = .79 (Feltes, 2005).

The State/Trait Anger Expression Inventory (STAXI) measured anger. Modifications were made to the original tool therefore, reliability and validity might have been altered. Psychometrics were not tested in this sample. Normative data was utilized to compare with the sample mean. Anger was present in the sample. Again, it is not clear if referrals were made. In

the future, State/Trait Anxiety Inventory for Children (STAI-C) should be utilized, which is the recommended version for children and adolescence (Spielberger, 1983).

As previously stated, anger and anxiety have not been studied as much as depression. If all 3 mood states are correlated, as supported by this study and several others, then future studies should study all 3 mood states together. Furthermore, future research should include pregnant teens, mood states, and smoking. Nonnemaker (Nonnemaker, 2004) confirmed that adolescents have not been studied in relation to their nicotine dependence.

From previous work of total score and item analysis of the Fagerstrom Test for Nicotine Dependence (FTND) and STAI, correlations were found between anxiety and smoking addiction (Feltes, 2005). This study hypothesized that anxiety should have predicted smoking dependence behavior and smoking consumption. Some of the anxiety questions asked about self-confidence and feeling secure and could be more reflective of self-efficacy. However, this study did not support the hypothesis. This study contradicted the work of Abrahamson (Abrahamsson, Springett, Karlsson, & Ottosson, 2005) who found that teens are anxious about getting caught smoking. This study also contradicted Kassel (Kassel, Stroud, & Paronis, 2003) who reported that teen smokers smoke to feel more relaxed. Preliminary work found that anxiety is related to smoking dependence behavior and consumption (Feltes, 2005). Surprisingly, this study did not support preliminary work and the hypothesis was not realized. Another possible explanation was that there were other factors such as social support involved that played a significant role in the development of the model.

In this study, anger was not realized as a predictor of smoking dependence behavior or smoking consumption. Anger is a state, an impulse. Hostility is internalized anger, a trait, a pessimistic way of life, not an impulse. Most questions reflected anger, not hostility. Anger and

hostility were reviewed because of the wording of the questions on the STAXI, and not aggression, violence, and abuse.   Because of the wording of the questions, validity of the instrument is jeopardized. One question reflected anger, but in a different way, asking about "hitting." It is unclear if hostility, violence or anger was to be measured. The literature often interchanges these terms. There is not a way to go back and evaluate or change this data. This is the disadvantage of secondary analysis. It is not known if this was the intention of the parent study when data were collected. Item analysis was not done on the questions concerning anger and hostility. Item analysis should be considered in the future since the scale was modified and not administered as intended by Spielberger (Spielberger, 1983). This study contradicted the work of Cornelius (Cornelius, Leech, & Goldschmidt, 2004) and found that persistent adolescent smokers had more aggressive problems. Anger is very understudied in this population. Future research should include more in-depth analysis of anger and hostility and investigate the reliability and validity of the chosen instrument.

5.8   MOOD STATES AND SMOKING DEPENDENCE BEHAVIOR

Given the developmental stage of adolescence, anger and anxiety reflect the acting out or independence the teens are trying to achieve. Anger and anxiety were present in this sample. The means for anger and anxiety in this sample were approximately 20 from a possible 40. The mean for depression was 29, well above the cut-off of 16. It is surprising that depression, anger, and anxiety did not predict smoking dependence behavior or smoking consumption. Patton (Patton et al., 1996) found that depression and anxiety do predict smoking frequency and that it was supported by investigation of the subject's diary for smoking. However, all of the measures

utilized in this study and in Patton's (Patton et al., 1996)study were self-report. Bias is present in self-report measures. This study did not support these findings. Depression, anger, and anxiety were not associated with smoking dependence behavior or smoking consumption. The hypotheses were not realized.

5.9   SMOKING

The participants had very low scores on the FTND, approximately a mean of 4, which was used to measure smoking dependence behavior, well below the cut-off of 6 for nicotine dependence. The participants smoked a low number of cigarettes, less than 10 daily, as indicated by the FTND and their average number of cigarettes smoked per day data. This study supported the work of Moolchan (Moolchan, Ernst, & Henningfield, 2000) that teens are different from adults and are not strongly addicted.   Gervais (Gervais, O'Loughlin, Meshefedjian, Bancej, & Tremblay, 2006) found that addiction can be as soon as after the first puff. Adolescents are "chippers." Teens share cigarettes, smoke half of the cigarette, delay smoking until later in the morning, and have lookouts to protect the group from getting caught (Shiffman, 1993). Braxter (Braxter, 2003) found that adolescents smoke fewer cigarettes and delay smoking and that cultural norms and rules play a part in the addiction level of the teen. A possible explanation for this low addiction level might be that teens are not addicted in the way adults are, but they are addicted, they are dependent. The addiction level by number might be low but the subjects are psychologically addicted. Stotts (Stotts, DeLaune, Schmitz, & Grabowski, 2004) stated this theory and found that women do not quit, only temporarily stop while pregnant. Even though addiction is low by self-report, cessation is difficult and this sample of teens did not quit as

reported by Albrecht (Albrecht et al., 2006) from the findings of the parent study. Fagerstrom (Fagerstrom et al., 1996) reported that those who come for treatment are highly dependent, having a mean of 5.15 to 6.55 on the FTND, in his study. The mean in this study for the FTND was only 4, but evidence suggested that this sample of pregnant adolescents were addicted and dependent on nicotine. Hypotheses were formulated to investigate the smoking behavior of the subjects in order to add strength to the analysis and the study. None of the null hypotheses were rejected. The variables of mood states did not predict smoking dependence behavior. The difference between physiological and psychological dependence comes into question. The subjects do have an increased drive to smoke as evidenced by their continuation of smoking during their pregnancy and beyond. The subjects stated that they don't want to harm the baby, but continue to smoke. Most of the subjects are addicted.   Altered mood states are present, the changes and turmoil of adolescence are a given, the teens are pregnant. Surprisingly, this study contradicted Seguire (Seguire & Chalmers, 2000) who found that mood states predicted smoking addiction and behavior.

As previously stated, the FTND had low Cronbach alphas, which vary from study to study in this population and others. Moolchan (Moolchan, Ernst, & Henningfield, 2000) thought that the tool wasn't the problem but that physiologic measures should be added to strengthen the analysis. Feltes (Feltes, 2005) found that this tool was effective when used to correlate findings with the anxiety total score and in item analysis. This study did not support the work of Franken (Franken, Pickworth, Epstein, & Moolchan, 2006) who refuted this theory and stated that the FTND was not appropriate for teens and that "cigarettes per day" should be used as the outcome variable. This study did utilize cigarettes per day , however, there was not difference in the results. Mood states were not associated with the number of cigarettes per day. Robinson

(Robinson, Berlin, & Moolchan, 2004) found that the FTND was appropriate for use with an adolescent population. Radzius (Radzius et al., 2003) found a 2 factor structure for the FTND which further confirms support of the FTND as being a valid and reliable instrument. The FTND is an adequate tool that can be used in a teen, smoker, population, because of its conciseness and ease of administration. However, Braxter (Braxter, 2003) found that the FTND only had a .26 reliability in African Americans and .55 in White adolescents and failed to predict smoking cessation because of limited variability of the sample. Clearly, there are contradictions in the literature concerning the FTND and more research is needed, especially with pregnant, teen, smokers.

Seguire (Seguire & Chalmers, 2000) used a modified and validated version of the Fagerstrom Tolerance Questionnaire (FTQ), nine questions to assess nicotine addiction, in a sample of adolescents. Future studies could incorporate this instrument because of its documented use with teens, which might be more complete than the FTND. However, the FTQ has a lower reliability than the FTND (Braxter, 2003). The Heavy Smoking Index (HSI) (Diaz et al., 2005), using only the first 4 items of the FTND, with a cut-off of 4 and sensitivity of 94%, and other new instruments together with biomeasures, can be a complete battery to evaluate both the physical and psychological aspects of addiction. The Nicotine Dependence Scale for Adolescents (NDSA), with a reliability of .81, could be evaluated in pregnant adolescent smokers and compared to the FTND and HSI. However, the FTND is the most widely used tool for nicotine dependence and is an adequate measure of nicotine addiction (Diaz et al., 2005).

5.10   SELF-EFFICACY

Self-efficacy was defined as the belief of the subject that she was able to quit smoking for a specified period of time. Those individuals who reported a higher confidence in their ability to quit reported less smoking dependence behaviors. The participant believed that she could quit smoking in a day or in one year from baseline. Self-efficacy was measured by the Confidence Scale by Velicer (Velicer, Diclemente, Rossi, & Prochaska, 1990) with a Coeffient Alpha reported as .92 to .99.   Self-efficacy had the only significant association with smoking dependence behavior, an inverse relationship. This research supported the work of several other studies. Quinn (Quinn, 2000) found that women who quit smoking in pregnancy are younger, are more confident about quitting, having their first baby, have more education, and are less addicted. Woodby (Woodby, Windsor, Snyder, Kohler, & Diclemente, 1999), in a study of 435 pregnant smokers, found that self-efficacy predicted non-smoking in late pregnancy. Quinn (Quinn, 2000) in the Kaiser Permanente Southern California Prenatal Smoking Project reported that quitters are more confident about quitting and are less addicted to smoking cigarettes. This study supported these works and found that this sample of pregnant teen, smokers who were more confident of quitting were less dependent on cigarettes.

According to DeVries (de Vries & Backbier, 1994) self-efficacy contributed to smoking behavior, explained 14% of the variance, and is the key to maintaining smoking cessation. This was demonstrated in a sample of 103 pregnant women who smoked, in which relapsers were found to have the lowest self-efficacy. Abrahamsson (Abrahamsson, Springett, Karlsson, & Ottosson, 2005) confirmed that an increase in self-efficacy is related to the decision to stop smoking and low self-efficacy is related to a lack of control over smoking. Ludman (Ludman et al., 2000) agreed and found that those who continue to smoke have decreased confidence to quit.

Mulllen (Mullen, 1999) found that self-efficacy is linked with smoking cessation. Self-efficacy has been shown to predict smoking cessation as reported by Moore (Moore, Turner, Park, & Adler, 1996). This study found that low self-efficacy contributes to tobacco dependence. Several other studies have linked high self-efficacy to smoking cessation. Self-efficacy could be the key to prevention, education, and cessation programs.

Mullen (Mullen, 1999), in a study of 392 women, reported that self-efficacy did predict smoking abstinence to the 6-week postpartum time point. Abrahamsson (Abrahamsson, Springett, Karlsson, & Ottosson, 2005), in a qualitative study of 17 Swedish women, confirmed that self-efficacy must be increased for pregnant women to take control over their smoking and this principle should be the basis of education. A possible explanation for all of these findings is that self-efficacy is linked to cessation, cessation is linked to addiction, then, self-efficacy is linked to addiction, and part of addiction is smoking behavior or number of cigarettes smoked as confirmed by this study. If the subject was a "strong person" and believes that she can quit, she was not highly addicted in the first place and was confident that she could quit soon. Moore (Moore, Turner, Park, & Adler, 1996) in a sample of 241 women found that self-efficacy was the strongest predictor of smoking in pregnancy and that self-efficacy is linked with pregnant women's smoking from past experience, past experience indicates habit strength and self-efficacy reflects her awareness of the difficulty of changing the habit. If the client believes that she can quit, she has a greater chance of quitting. Another possible explanation is that habit is addiction and addiction includes the psychological and the physical components of that process of addiction. This theory confirms the work of Dijkstra & Tromp (Dijkstra & Tromp, 2002) who found that the FTND does measure both the biological and psychological aspects of addiction

and that 23% of the variance was explained by the concepts of self-efficacy, loss of function, and expected withdrawal symptoms, comparable to variance explained by the biological measures.

Relapse is related to stress and negative affect, consequently, women start smoking again in post-partum period (Stotts, DeLaune, Schmitz, & Grabowski, 2004). Stotts (Stotts, DeLaune, Schmitz, & Grabowski, 2004) found that an intervention that focused on motivation did increase confidence or self-efficacy to maintain smoking cessation and decreased depression. Self-efficacy has been shown to predict smoking cessation as reported by Moore (Moore, Turner, Park, & Adler, 1996). Woodby (Woodby, Windsor, Snyder, Kohler, & Diclemente, 1999) confirmed that self-efficacy predicted non-smoking status. Therefore, self-efficacy must be studied to gain more knowledge of the role that it plays in mood states and smoking addiction.

This study supported the work of several other studies except the work of Jesse (Jesse, Walcott-McQuigg, Mariella, & Swanson, 2005) who refuted all of the above mentioned research and found that self-esteem was not significant, but social support and stress were variables of significance in quitting smoking during pregnancy. Faucher (Faucher & Carter, 2001) revealed that preventing teen girls from smoking must center on building their self-esteem and self-image and those programs to prevent smoking must include self-esteem, self-image, and self-efficacy. Care must be taken in the definition and use of terms such as self-efficacy and self-esteem, which do not measure the same concept. Self-esteem and self-efficacy go hand in hand. Increased self- efficacy means prevention.

Given the findings from this study and several others, the following model is proposed:
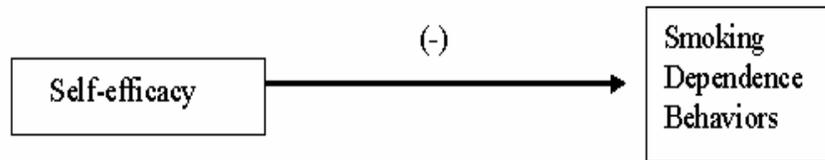
Figure 2: Proposed conceptual model of self-efficacy and smoking dependence behavior

Literature review has demonstrated that smoking cessation programs do not work. Models must be re-evaluated and addiction and dependence must be appropriately re-defined. The sample of pregnant adolescent smokers in this study are addicted, but are "chippers" (Shiffman, 1993). The participants are light smokers, but are addicted. Self-efficacy was related to their nicotine dependence. Nicotine addiction must be further examined in pregnant adolescents. Their dependence cannot be evaluated on the same level as their adult counterparts. Unfortunately, as stated above, most of the literature in this arena has employed pregnant, women, smokers and not teens. Nicotine dependence must be defined in teens so that interventions can appropriately target their smoking addiction and behavior. Moolchan (Moolchan, Ernst, & Henningfield, 2000) agreed that nicotine dependence must be defined and treatments be evaluated and refined to increase quit rates and success. Stotts (Stotts, DiClemente, Carbonari, & Mullen, 1996) revealed that self-efficacy seen in pregnant smoking quitters might be a false positive, temporary abstinence is common during pregnancy and relapse after delivery is the norm.

This study supported the work of Woodby (Woodby, Windsor, Snyder, Kohler, & Diclemente, 1999) who used a sample of 53% African Americans and 47% Whites, 15 – 46 years of age, 3 - 24 weeks pregnant, smoking women. Woodby (Woodby, Windsor, Snyder, Kohler, & Diclemente, 1999) measured smoking status with a modified version of the FTND and found that self-efficacy did predict smoking status and that dependence is a barrier to cessation. Woodby (Woodby, Windsor, Snyder, Kohler, & Diclemente, 1999) also found that living with a smoker predicted inability to quit. The findings of this study are comparable to the work of Woodby (Woodby, Windsor, Snyder, Kohler, & Diclemente, 1999).

5.11   LIMITATIONS

There are several limitations in this study. First of all, this study was a secondary data analysis. The data could not be clarified or changed. The data was utilized as it was. In the case of the depression data, there were outliers, skewness, and kurtosis. However, the data was not changed to preserve the accuracy of the original data set. Future studies should incorporate transformations and deletion of outliers to normalize the distribution of the variable. Secondly, some of the measurement tools were changed for ease of reading and comprehension by teen participants. Modified tools could be one of the reasons that mood states did not predict smoking dependence behavior or consumption. Future research should include testing of modified instruments for psychometrics in adolescent, pregnant, smoking populations. Another limitation is the distribution of the sample by race. The sample was half African-American and half White. The sample did reflect the population of the surrounding area of recruitment, not the population of teens in the United States. Future research should include a diverse sample

reflective of the population. Generalizability to the population of pregnant, teen, smokers is limited. Lastly, mood states did not predict smoking dependence behaviors or consumption in this sample when the literature indicated that there are relationships present between mood states and smoking. Qualitative and quantitative research needs to be completed with pregnant, teen, smokers. Unfortunately, most of the studies were with White, married women. Given the presence of the mood states in the sample, the results were surprising. The pregnant, adolescent, smokers were depressed, angry, and, anxious, but not about their smoking. Further research that studied pregnant, teen, non-smokers could shed light on the high levels of altered mood states in pregnant, teen, smokers, which could lead to more successful interventions and smoking cessation.

5.12   SUMMARY

The purpose of this research was to explore and predict smoking dependence behaviors and smoking consumption by examining the relationships of depression, anger, and, anxiety through secondary analysis of an existing data set, in a sample of pregnant, adolescent, smokers. It was hypothesized that mood states are present, inter-related and effect smoking in the sample of pregnant, adolescent, smokers. The sample for this study was a subset from the study "Nursing Intervention for Young Pregnant Smokers" (Principle Investigator: S. Albrecht, RO1 NR 03233). The subset was selected by virtue of having complete data on the variables of interest, namely depression, anger, anxiety, and smoking dependence behavior and consumption. For this secondary analysis, 108 subjects were identified. After screening of the data and verifying the assumptions, descriptive statistics, correlational analysis, multiple regression, and, hierarchical

multiple regression were performed and the relationships assessed to answer the research questions. This study supported the literature and confirmed the findings of many studies: depression, anger, and anxiety were found to be highly significantly correlated. Unfortunately, the findings from this study did not support the literature; the variables of mood states did not predict smoking dependence behavior or consumption. However, self-efficacy had the only significant association with smoking dependence behavior. Several limitations were identified with recommendations for future research. Nursing implications include assessment of critical levels of altered mood states in pregnant teens, especially smokers. Referrals must be made to primary care providers. Self-efficacy of clients must also be assessed to provide the foundation for treatment and interventions to decrease tobacco dependence and foster smoking cessation. Healthy mothers and healthy babies are the goals of research in this arena and this study has added to the knowledge base in obstetrical care for pregnant, teen, smokers.

APPENDIX A: **IRB APPROVAL LETTER**

University of Pittsburgh
Institutional Review Board

Exempt and Expedited Reviews

3500 Fifth Avenue
Suite 100
Pittsburgh, PA 15213
Phone: 412.383.1480
Fax: 412.383.1508

TO: Kathleen Feltes

FROM: Sue R. Beers, Ph.D., Vice Chair

DATE: October 31, 2005

PROTOCOL: Anxiety, Depression, Anger, and Self-Efficacy in Pregnant, Adolescent
Smokers

IRB Number: 0510094

The above-referenced protocol has been reviewed by the University of Pittsburgh
Institutional Review Board. Based on the information provided in the IRB protocol, this
project meets all the necessary criteria for an exemption, and is hereby designated as
"exempt" under section 45 CFR 46.101(b)(4).

The regulations of the University of Pittsburgh IRB require that exempt protocols be re-
reviewed every three years. If you wish to continue the research after that time, a new
application must be submitted.

- If any modifications are made to this project, please submit an 'exempt
  modification' form to the IRB.

- Please advise the IRB when your project has been completed so that it may be
  officially terminated in the IRB database.

- This research study may be audited by the University of Pittsburgh Research
  Conduct and Compliance Office.

Approval Date: October 31, 2005
Expiration Date: October 31, 2008

SRB:ky

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