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PYSCHOSOCIAL WELL-BEING AND EFFORTS TO QUIT SMOKING IN PREGNANT WOMEN OF SOUTH- CENTRAL APPALACHIA

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Psychosocial Well-Being and Efforts to Quit Smoking
in Pregnant Women of South-Central Appalachia

A thesis
presented in partial fulfillment
of the requirement for the Department of Psychology
University Honors Scholar Program
and
the Department of Allied Health Sciences
Nutrition Honors-in-Discipline Program at
East Tennessee State University

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Abstract

A sample of 1,031 pregnant women from five prenatal practices participated in Tennessee Intervention for Pregnant Smokers (TIPS), an expanded 5A's (Ask, Advise, Assess, Assist, Arrange) program. Stress, self-esteem, depressive symptoms, and disordered eating were hypothesized to differ among three groups: pregnant women who never smoked, pregnant women who smoked but quit prior to birth, and pregnant women who smoked and did not quit prior to birth. Smokers who quit were lower in stress and higher in self-esteem than those who did not quit. Non-smokers were lowest in stress and depression, and highest in self-esteem. These findings may lead to improved intervention programs and reduction of adverse health effects in children born to mothers who smoke.

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Psychosocial Well-Being and Efforts to Quit Smoking in Pregnant Women of South-Central Appalachia

The purpose of the Tennessee Intervention for Pregnant Smokers (TIPS) study was to implement an intervention program to help pregnant smokers in South-Central Appalachia quit smoking before giving birth. The current study analyzed TIPS participant scores on psychosocial and disordered eating instruments.

Background

Smoking during pregnancy can be dangerous to the health of the unborn fetus and has been extensively researched (Bailey, 2015; Floyd, Rimer, Giovino, Mullen, & Sullivan, 1993; "Smoking during pregnancy," 2015; "Tobacco use and pregnancy," 2017). According to the Centers for Disease Control and Prevention (CDC), smoking during pregnancy can increase the likelihood of miscarriage and birth defects, disrupt the flow of oxygen and nutrients through the placenta, and cause premature low birth weight babies ("Tobacco use and pregnancy," 2017). Unfortunately, pregnant women continue to participate in this hazardous behavior, and some populations have significantly higher rates of smoking during pregnancy than others, such as women living in the Appalachian region and earning incomes that fall below poverty level (Bailey, 2015; Fang et al., 2004). Rates of women who smoke during pregnancy in Central and Southern Appalachia range from 25%-49%, reaching a level more than triple the national average (Bailey, 2015). Not surprisingly, rates of pre-term birth and low birth weight in Central and Southern Appalachia are also higher than the national average (Bailey, 2015). Pregnant women who already smoke can positively impact the life and health of their child by quitting the habit before delivery ("Smoking during pregnancy", 2015; "Tobacco use and pregnancy", 2017). In the TIPS study, women who were no longer smoking at delivery had infants with higher birth

weights, shorter hospital stays, and lower risk of neonatal mortality compared to the pregnant women who did not quit smoking (Bailey, 2015).

Clearly, smoking while pregnant endangers the fetus. Therefore, the TIPS study aimed to develop and implement an intervention program in South-Central Appalachia. As mentioned previously, rates of smoking during pregnancy are far above the national average in Central and Southern Appalachia, particularly among impoverished women (Bailey, 2015). The TIPS program achieved its purpose of smoking cessation for a large portion of participants, though more than half of the women did not quit smoking before delivery. Specifically, 45.4% of pregnant women in the study were nonsmokers, 22% quit smoking prior to delivery, and 32.6% did not quit smoking prior to delivery. Of the women who smoked, approximately 40% quit smoking prior to delivery and the remaining 60% of pregnant smokers did not quit smoking before delivery. What makes the women who quit smoking different from those who did not? If insight can be provided into this question, then subsequent intervention programs can be modified and targeted to help more pregnant women in Appalachia quit smoking – resulting in increased infant health and decreased complications upon delivery. Research and results on the overall effectiveness of the intervention have been published in the journal *Health Education and Behavior* (Bailey, 2015).

Literature Review

Some research has been done on the relationship between smoking, psychosocial factors, and disordered eating; however, most research focuses on the relationships among a select few instruments, such as smoking status and stress, and is often conducted among adolescent populations. Additional research on the relationships among psychosocial factors, disordered eating, and smoking during pregnancy is needed in order to develop more effective intervention

programs for pregnant smokers. The relationship between smoking and psychosocial factors in pregnant women can easily become blurred because pregnancy itself initiates feelings and experiences that otherwise would not occur. For example, stress increases the likelihood of preterm births and other adverse fetal outcomes (Peacock, Bland, & Anderson, 1995). The process of quitting smoking can increase an individual's stress, so it makes sense that women with already high levels of stress would not successfully quit smoking (Fink, 2010). Current research supports a correlation between stress and smoking, but little mention is made of this relationship in pregnant women. Stress alone has been related to preterm birth and low birth weight infants (Copper et al., 1996). Research exploring the biological effects of nicotine on the body not only support smoking as a coping mechanism for stress, it also suggests that quitting smoking may increase stress levels due to nicotine withdrawal (Parrott, 1995; Silverstein, 1982). Moreover, research has concluded that the calm many smokers receive from the habit is due to relief from nicotine withdrawal as opposed to an inherent calming effect for stress (Silverstein, 1982). This is significant because it frames smoking and stress as a cycle: once one starts smoking, stress increases between cigarettes as nicotine depletes in the body, so he/she smokes to alleviate the stress of deprivation (Parrott, 1995; Silverstein, 1982). Pregnant women who quit smoking near the beginning of their term had "lower levels of stress and depressive symptoms than baseline smokers" (Ludman et al., 2000, p. 21). Research on strategies to prevent postpartum relapse of smoking reports that women who quit smoking during pregnancy and then relapsed identified stress as a major contributor to their relapse (Fang et al., 2004).

Individuals who smoke often do so with the expectation that stress, anxiety, and other negative emotions will be alleviated (Brandon & Baker, 1991; Copeland, Brandon, & Quinn, 1995; Steptoe, 2007). Smoking is often reported as a coping mechanism to reduce stress, and a

strong correlation between both variables is supported in existing literature (Dozois, Farrow, & Miser, 1995; Nichter, Vuckovic, Quintero, & Ritenbaugh, 1997; Steptoe, 2007). Carey and colleagues (1993) compared individuals who quit smoking with smokers who did not quit and found that those who quit smoking reported less stress. The results of the study build upon the aforementioned research by suggesting that stress is more prevalent among continuous smokers. Carey and colleagues' (1993) findings are supported by others who conclude that smokers who try and subsequently fail to quit maintain increased levels of stress (Carey, Kalra, Carey, Halperin, & Richards, 1993; Cohen & Lichtenstein, 1990; Steptoe, 2007).

Relevant to the TIPS demographic, a study concluded that women who smoke while pregnant have high levels of stress, low social support from partners, and impaired self-esteem compared to pregnant women who do not smoke (Bullock, Mears, Woodcock, & Record, 2001). An additional study researched smoking and stress in areas of low socioeconomic status, concluding that people living in disadvantaged environments have "increased levels of perceived stress, making them more likely to start, and less likely to quit, smoking" (Tsourtos, Ward, & Muller, 2008, p. 1). The results of the above studies lead to the hypothesis that women who did not quit smoking in the TIPS study have higher levels of stress, as indicated by results of the Prenatal Psychosocial Profile (PPP; Rosenberg, 1965; Curry, Burton, & Fields, 1998).

As is the case with stress, much of the existing literature examining the relationship between self-esteem and smoking focuses on the adolescent population. Within this body of research, findings suggest gender differences in the relationship between self-esteem and smoking. For example, low self-esteem is a risk factor for smoking initiation in females from 6th-10th grade, but no correlation exists for males of this age group in the same study (Abernathy, Massad, & Romano-Dwyer, 1995). Female adolescents generally have lower self-esteem and

satisfaction with body image than male adolescents; subsequently, smoking was associated with low self-esteem (Croghan et al., 2006). A study conducted by pediatric nurses identified low self-esteem as a predictive factor for smoking and other risk behaviors in adolescents, such as drug use and sexual activity (Modrcin-Talbott, Pullen, Zandstra, Ehrenberger, & Muenchen, 2009). One study examined use of a parental smoking prevention model with a selected urban population and reported that a statistically significant number of females had lower self-esteem and higher rates of smoking compared to males (Murphy & Price, 1988). Murphy and Price (1988) recommended that families should promote children's self-esteem and parental avoidance of smoking before children enter 8th grade to more effectively prevent the children from smoking.

Self-esteem during pregnancy can be influenced by many variables, including, but not limited to, marital status, level of physical activity, and level of social support (Macola, Vale, & Carmona, 2010). The uncomfortable physical symptoms associated with pregnancy, such as nausea and weight gain, can directly influence a pregnant woman's self-perception (Kamysheva, Skouteris, Wertheim, Paxton, & Milgrom, 2008). Pregnant women who experience more frequent and intense adverse physical symptoms report greater depression and lower self-esteem when compared to those who experience milder pregnancy-related symptoms (Kamysheve et al., 2008). Research conducted by Mullen, Richardson, Quinn, and Ershoff (1997) relates to the previously stated prevalence of pregnant smoking among women of low socioeconomic. The lifestyle of women in this category, characterized by decreased access to education and healthcare, reduces both motivation and self-confidence in ability to quit smoking during pregnancy (Mullen et al., 1997).

Additional research provides inconclusive results about the relationship between smoking and self-esteem; however, the conflict exists primarily in adolescents (Glendinning & Inglis, 1999; McGee & Williams, 2000; Wild, Flisher, Bhana, & Lombard, 2004). One study showed no relationship between smoking and self-esteem in the adolescent sample (Mcgee & Williams, 2000). Other studies report that low self-esteem predicts lowered prevalence of smoking in adolescents of certain social group, whereas adolescents who associate with more social peer groups have high self-esteem and a higher likelihood of smoking (Glendinning & Inglis, 1999; Wild et al., 2004). Indeed, high self-esteem smokers have been recorded as less likely to commit to quitting smoking (Gibbons, Eggleston, & Benthin, 1997). Further research shows that self-esteem is not a contributing factor in whether young adults smoke; however, high self-esteem was shown to reduce bulimia risk in young females, which has implications for the second hypothesis in this study (Baumeister, Campbell, Krueger, & Vohs, 2003). It is significant to note that the conflicting evidence regarding self-esteem primarily concerns adolescents, whereas the TIPS study was not focused on this demographic. The hypothesis that women with low self-esteem are less likely to quit smoking is based upon the limited research on self-esteem and smoking in women. As stated previously, existing research also supports that females are more likely to have low self-esteem compared to males, and that there is a higher likelihood of low self-esteem in people of low socioeconomic status (Baumeister et al., 2003).

Like stress and self-esteem, individuals with a history of major depression are more likely to smoke than others, and there is a positive correlation between depression and smoking (Glassman, Covey, Stetner, & Rivelli, 2001; Lehto et al., 2000). A history of any psychiatric disorder has been found to predict higher rates of smoking when compared to individuals without a history of mental illness (Breslau, Kilbey, & Andreski, 1991; Covey, Glassman, & Stetner,

1998; Degenhardt & Hall, 2001; Lasser et al., 2000; Steptoe, 2007). In relation to non-smokers, individuals who smoke have a higher likelihood of depression; moreover, in relation to non-depressed persons, individuals with depression are more prone to smoke (Steptoe, 2007) and those who smoke have increased symptoms of depression compared to non-smokers (Anda, Williamson, & Escobedo 1990; Degenhardt & Hall, 2001; Steptoe, 2007; Waal-Manning & de Hamel, 1978). Persons who have a history of depression, particularly diagnosed at the clinical level, have a higher rate of failure when they attempt to quit smoking, and those who successfully cease are more likely to relapse (Glassman et al., 2001; Glassman et al., 1990; Hall, Munoz, Reus, & Sees, 1993; Steptoe, 2007). Indeed, depression significantly predicts one's likelihood of failure in smoking-cessation programs (Glassman et al., 1990; Steptoe, 2007).

Smoking and depression have been researched more extensively in adolescents compared to adults, though no conclusion has been reached as to the direction of the relationship. Breslau and colleagues (1993) report that individuals with a history of depression are at twice the risk of developing a nicotine-dependence (Breslau, Kilbey, & Andreski, 1993; Breslau et al., 1991). Symptoms of depression often lead to experimenting with cigarettes and beginning the smoking habit in a variety of age groups, particularly in adolescents (Brook, Cohen, & Brook, 1998; Brown, Lewinsohn, Seeley, & Wagner, 1996; Escobedo, Reddy, & Giovino, 1998; Ferdinand, Bluem, & Verhulst, 2001; Kandel, Davies, Karus, & Yamaguchi, 1986; Steptoe, 2007). On the other hand, Breslau (1993) argues that nicotine dependence from smoking increases one's risk of developing major depression. Several other studies report a similar trend, that smoking cigarettes precedes the onset of depression among adolescents (Brown et al., 1996; Choi, Patten, Gillin, Kaplan, & Pierce, 1997; Goodman & Capitman, 2000; Steptoe, 2007; Windle & Windle, 2001). The influence of peers who smoke contributes to the depression and anxiety that lead into

smoking initiation (Patton et al., 1998; Steptoe, 2007). Moreover, a longitudinal study following a cohort of 21 years controlled for confounding adolescent and childhood factors (i.e., major depression; social, familial, and behavioral factors) and still found that individuals with clinical depression had higher rates of smoking dependence on nicotine than those who were not depressed (Fergusson, Goodwin, & Horwood, 2003; Steptoe, 2007).

The relationship between depression and smoking in the TIPS study is unknown, and research on both factors among pregnant women is slim. One study found that pregnant women with persistent depression smoked more than women without symptoms of depression (Blalock, Robinson, Wetter, & Cinciripini, 2006) and, as stated previously, pregnant women who quit smoking early on during pregnancy had lower levels of depression compared to baseline smokers (Ludman et al., 2000). Existing research speaks of smoking, pregnancy, depression, and other psychosocial issues (i.e. social support, stress) in various combinations, but little has been done with these factors combined. Filling in the gaps on the relationship between depression and smoking in the pregnant population is needed to better understand the implications of psychosocial factors during pregnancy and to improve future intervention programs.

In addition to the psychosocial factors of stress, self-esteem, and depression, TIPS participants were also scored on patterns of disordered eating. Eating disorders are defined by the National Institute of Mental Health as medical illnesses associated with a variety of antagonistic psychosocial influences and outcomes ("Eating disorders: about more than food," 2014). Because smoking can assist in weight loss, the habit is appealing to many women with body image issues and often accompanies eating disorders (Kendzor, Adams, Stewart, Baillie, & Copeland, 2008; Wisemn, Turco, Sunday, & Halmi, 1998). Smoking as a means of weight control is often a deciding factor in continued smoking in women with disordered eating

patterns, and these women report fear of weight gain as the reason why they will not quit smoking (Cachelin, Veisel, Barzegarnazari, & Striegel-Moore, 2000). Women who are dieting to lose weight will, at times, start smoking to further their weight loss efforts, and current smokers on diets generally have shorter attempts and less success at quitting smoking than women who are not actively trying to lose weight (Jarry, Coombs, Polivy, & Herman, 1998).

Like much of the other existing research cited, research on the relationship between disordered eating and smoking is largely concentrated on a young population. Unhealthy behaviors related to weight, such as smoking cigarettes for weight loss and/or control, can be defined as a disordered eating behavior. Subsequently, smoking was the second most prevalent disordered eating behavior reported in a large study of adolescent males and females (Croll, Neumark-Sztainer, Story, & Ireland, 2002). In high school females, a strong association exists between disordered eating and smoking, and multiple dieting behaviors are directly related to smoking (French, Perry, Leon, & Fulkerson, 1994; Pisetsky, Chao, Dierker, May, & Striegel-Moore, 2008). No correlation exists between disordered eating and smoking in young boys (French et al., 1994). Additional research suggests that bulimia nervosa specifically, is more prevalent in young adult females who smoke compared to women who do not smoke (Kendzor et al., 2008).

Cigarette smoking and several of the psychosocial factors mentioned above have been related to eating disorders through past research. One study targeting college women and utilizing the EAT-26 instrument showed that increased social support is related to a decrease in disordered eating patterns (Muehlenkamp & Saris-Baglama, 2002). An additional study demonstrated depression as mediating factor between negative self-image and disordered eating (Wonderlich-Tierney & Vander Wal, 2010). Additionally, female smokers who are concerned

with body weight are not likely to attempt or seek treatment for smoking cessation (Pomerleau, Zucker, & Stewart, 2001). Overweight and obese women who smoke often need help with body image and disordered eating patterns to maintain a healthy weight and/or quit smoking, and women with high BMIs are shown to have higher cravings and more difficulty maintaining abstinence during quit attempts compared to low BMI women (Pomerleau & Saules, 2007; Saules, Pomerleau, Snedecor, Brouwer, & Rosenberg, 2004). In an article published in the journal *Eating Behaviors*, Anzengruber and colleagues (2006) clearly state that women with eating disorders have higher rates of cigarette smoking and higher rates of nicotine dependence compared to women who do not have eating disorders. As is the case with most hypotheses, there is research that indicates no relationship between eating disorders and smoking; however, this research is less recent and less abundant than research supporting the hypothesis that women with disordered eating patterns are less likely to quit smoking (Xinaris & Boland, 1990).

Regarding pregnancy and eating disorders, women who have eating disorders tend to show a significant decrease in symptoms during pregnancy; however, symptoms of disordered eating return shortly after delivery (Blais et al., 1999). Research on birth outcomes among women with eating disorders is controversial. Compared to pregnant women with no symptoms of disordered eating, certain studies report an increased risk of low birth weight, pre-term infants, and cesarean section in women with eating disorders whereas others report no difference in impaired birth outcomes (Blais et al., 1999; Franko et al., 2001; Sollid, Wisborg, Hijort, & Secher, 2004). The aforementioned studies support the hypothesis that women with disordered eating patterns are less likely to quit smoking than women who do not exhibit disordered eating patterns. Relationships among cigarette smoking, psychosocial well-being, and pregnancy have been studied in females with eating disorders, respectively; however, little to no research has

been done on all factors combined. Even less research exists relating disordered eating to smoking cessation during pregnancy, amplifying the need to examine these factors together in the TIPS study.

Research Question(s)

Do pregnant women in Southern and Central Appalachia who did not smoke, quit smoking before birth, or did not quit smoking before birth differ significantly on factors known to predict smoking in other populations (i.e., stress, self-esteem, depression, disordered eating)?

Hypothesis:

1. Stress, as indicated by scores on the stress subscale of the PPP (Rosenberg, 1965; Curry et al., 1998) will differ significantly among pregnant women who never smoked, women who smoked but quit prior to birth, and women who smoked and did not quit prior to birth.
2. Self-esteem, as indicated by scores on the self-esteem subscale of the PPP (Curry et al., 1998) will differ significantly among pregnant women who never smoked, women who smoked but quit prior to birth, and women who smoked and did not quit prior to birth.
3. Depressive symptoms, as indicated by scores on the CESD-10 (Radloff, 1977), will differ significantly among pregnant women who never smoked, women who smoked but quit prior to birth, and women who smoked and did not quit prior to birth.
4. Disordered eating, as measured by the EAT-26 (Garner, Olmsted, Bohr, & Garfinkel, 1982), will differ significantly among pregnant women who never smoked, women who smoked but quit prior to birth, and women who smoked and did not quit prior to birth.
5. The odds of pregnant women from Southern Appalachia quitting smoking prior to birth will be predicted by stress, depressive symptoms, and disordered eating.

Methods

Participants

Participants for the TIPS study were recruited from five prenatal practices in South-Central Appalachia. Beginning January 2008, all women beginning prenatal care at the practices who also currently smoked were eligible to participate. In 2009, women who did not smoke began to be enrolled as comparison cases. Participants consisted of 1063 pregnant women, 468 were non-smokers. A subset of the sample ($n = 1031$) that had complete data were analyzed for the purpose of the study: 468 pregnant women who never smoked, 227 women who smoked but quit prior to birth, and 336 women who smoked and did not quit prior to birth. Women whose pregnancy did not continue past 20 weeks and who delivered with fewer than four weeks of prenatal care were excluded. Participants received a \$20 incentive payment for each interview. Participant ages ranged from 14 to 45 years of age, with the mean age being approximately 25 years. Related to education, 18.3% of participants did not graduate from high school, 42.2% graduated from high school, 23.2% possessed some college education, and 16.2% graduated from college. Over 90% of participants were Caucasian.

Convenience sampling was used to select participants. When women attended their first prenatal healthcare appointment, the research and intervention components of TIPS were briefly explained so interested patients could provide informed consent. Prenatal care at all five practices included an initial assessment of smoking behavior and advice to cease the habit, if present. Additional smoking-related care varied by practice, such as advice on how to quit smoking and reevaluating smoking status at subsequent appointments.

Procedures

Procedures for TIPS were approved by the East Tennessee State University institutional review board, and all participants were provided with informed consent. Participants were interviewed in the first and third trimester, at 6 weeks postpartum, 6 months postpartum, and were interviewed for the final time with the child when he/she was 15 months old. Assessments included demographics, smoking and substance use, and mental and social issues. As part of the smoking measurements, exhaled carbon monoxide levels were measured with a carbon monoxide monitor and urine samples were collected and analyzed for cotinine.

The intervention was tailored to match the participant's willingness to quit smoking within the next 30 days, as indicated at the first prenatal visit. On a scale increasing from 1 to 10, women who indicated a willingness to quit evidenced by a value greater than or equal to 3 were presented with an intervention by a trained health educator; women who indicated a willingness to quit of 2 are included in the sample, though they may have declined intervention services. The intervention was personalized to the needs of each participant, though every intervention explored discrepancies between current behavior, personal goals, and health recommendations (Bailey, 2015). Additionally, each participant was provided with a self-help book designed for the TIPS study, which the interviewers discussed at the initial meeting and encouraged participants to utilize throughout their pregnancy. Personalized intervention assistance is described in the initial publication by Bailey (2015) and included the following:

Practical tips for changing thinking and the environment leading up to quitting, education about withdrawal and how to manage it, use of a cessation contract and/or written action plan, assistance with practical needs (food, housing, transportation), stress relief advice, counseling or referral to counseling for stress and/or mental health issues, information about/referral to the state-administered smoking quit line, information about online

resources, cessation education, assistance and referrals for family members, and enhancing motivation to attend all recommended prenatal visits (p. 827).

The initial interviews were from 15 to 30 minutes in length, and subsequent interviews were 10 to 20 minutes long and followed the same expanded 5A's model. Participants were provided with the contact information for their health educator and were encouraged to schedule additional sessions if desired. Fidelity checks were conducted throughout the study to ensure that health educators were properly implementing and personalizing the 5A's model.

Upon delivery, information on the birth outcomes of each infant was collected from the hospital newborn delivery records. Data on the following categories was obtained: "newborn health status (live birth vs. fetal demise, type of nursery care [neonatal intensive care unit vs. regular], and 1- and 5-minute Apgar scores), gestational age at delivery (based on ultrasound dating), birth size (weight, length, head circumference), and type of delivery (vaginal vs. cesarean)" (Bailey, 2015, p. 828).

Materials

Using an expanded 5A's (Ask, Advise, Assess, Assist, Arrange) model and motivational interviewing, the intervention was implemented by trained health educators over the course of 4 prenatal visits (typically occurring monthly in the first and second trimesters of pregnancy). A variety of instruments were completed including, but not limited to, the Prenatal Psychosocial Profile (PPP; Curry et al., 1998), the Center for Epidemiologic Studies Depression Scale (CESD-10; Radloff, 1977), and the Eating Attitudes Test-26 (EAT-26; Garner et al., 1982). In addition to the mental health and social issues instruments, interviews included demographics, smoking, and substance use surveys. The majority of instruments were delivered on paper, and for women who

had low literacy levels, instruments were read orally. Prenatal and delivery hospital charts were accessed and reviewed to analyze birth outcomes.

Prenatal Psychosocial Profile (PPP). The PPP (Curry et al., 1998) is divided into three sections, two of which are used in the current study: stress and self-esteem. The stress subscale of the PPP is an 11-item test scored on a 4-point Likert-type scale. Scores range from 1 (*no stress*) to 4 (*severe stress*). Answers are chosen based on how much stress each statement, such as “*Financial worries (e.g. food, shelter, health care, transportation,*” is causing the participant at the current moment. Summed scores range from 11 – 44, and higher sums indicate higher levels of stress. The self-esteem subscale of the PPP follows a similar pattern, with responses ranging from 1 (*strongly agree*) to 4 (*strongly disagree*). This subscale consists of the complete 10-item Rosenberg Self-Esteem Scale (Rosenberg, 1965). Each item is a statement, such as “*I feel I do not have much to be proud of*”. One additional item “*Feel like you have control over your life*” was added to the original scale for the PPP (Curry et al., 1998, p. 212). The higher the resulting sum of responses, the lower the respondent’s level of self-esteem.

Center for Epidemiologic Studies Depression Scale (CESD-10). The CESD-10 (Radloff, 1977) is comprised of 10 items using a 3-point Likert-type response scale. Participants respond to each item based on its relevancy during the week preceding the survey, such as “*I was bothered by things that usually don’t bother me*”. Questions 5 and 8 are scored based on a scale ranging from 3 (*rarely or some of the time*) to 0 (*most or all of the time*). All other items were scored in the reverse manner, from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). For example, a woman who was “bothered by things that don’t usually bother [her]” for “most or all of the time” in the past week would choose a 3 for that statement. A sum of the 10 items

totaling greater than or equal to 10 indicated that the individual is depressed. The test should not be scored if more than two items are left unanswered.

Eating Attitudes Test-26 (EAT-26). The EAT-26 (Garner et al., 1982) is comprised of 26 items on a 3-point Likert-type scale. The first 25 items are scored on a response range from 3 (*always*), 2 (*usually*), 1 (*often*) and 0 (*sometimes, rarely, or never*). An item example is “*Find myself preoccupied with food*”. The final item (*Enjoy trying new rich foods*) is scored on a reverse scale, from 0 (*always, usually, or often*), 1 (*sometimes*), 2 (*rarely*), and 3 (*never*) (see Figure 1). The sum of all responses is used to assess one’s risk of having an eating disorder. Final scores greater than or equal to 20 are considered significant, and individuals who score in this range are recommended to consult a mental health or other medical professional with experience diagnosing eating disorders. Scores below 20 do not rule out an eating disorder and may indicate a clinical condition in denial. For the purpose of this study, only scores of 20 or higher were considered as significant indicators of eating disorder risk.

Figure 1. Scoring of the EAT-26.

EAT-26 SCORE	Scoring System for the EAT-26					
	Always	Usually	Often	Sometimes	Rarely	Never
Score for questions 1-25	3	2	1	0	0	0
Score for question # 26	0	0	0	1	2	3

Smoking Status. Smoking status was assessed via self-report, exhaled carbon dioxide in a CO monitor, and the level of tobacco alkaloid cotinine in urine samples. If any measure was positive for tobacco, the woman was considered to be a current smoker.

Data Analysis

The results of each survey were analyzed quantitatively by calculating two subscale scores of the PPP (i.e., self-esteem and stress), score of the CESD-10, and score on the EAT-26.

Hypotheses were tested with the following analyses:

Hypothesis 1: One-way Analysis of Variance (ANOVA) was conducted to compare scores on the stress subscale of the PPP for women who never smoked, women who quit smoking prior to birth, and women who did not quit smoking prior to birth.

Hypothesis 2: One-way Analysis of Variance (ANOVA) was conducted to compare scores on the self-esteem subscale of the PPP for women who never smoked, women who quit smoking prior to birth, and women who did not quit smoking prior to birth.

Hypothesis 3: One-way Analysis of Variance (ANOVA) was conducted to compare scores on the CESD-10 for women who never smoked, women who quit smoking prior to birth, and women who did not quit smoking prior to birth.

Hypothesis 4: One-way Analysis of Variance (ANOVA) was conducted to compare scores on the EAT-26 for women who never smoked, women who quit smoking prior to birth, and women who did not quit smoking prior to birth.

Hypothesis 5: Logistic regression was conducted to assess the degree to which stress (measured by the PPP), self-esteem (measured by the PPP), depressive symptoms (measured by the CESD-10), and symptoms of disordered eating (measured by the EAT-26) predict odds of smoking cessation in pregnant smokers in Southern Appalachia.

Results

Women's stress levels differed by smoking status ($F(2,1027) = 46.38, p < .001$). Those who never smoked reported significantly lower stress levels ($M = 17.31, SD = 4.38$) than women

who quit by delivery ($M = 19.28$, $SD = 4.95$), and women who quit who quit by delivery reported stress levels that were significantly lower than women who did not quit ($M = 20.61$, $SD = 5.38$).

Women's self-esteem differed by smoking status, with nonsmokers reporting higher self-esteem ($F(2,1018) = 29.81$, $p < .001$). Women who never smoked reported significantly higher self-esteem ($M = 36.99$, $SD = 5.46$) than women who quit by delivery ($M = 35.47$, $SD = 5.61$), and women who quit who quit by delivery reported significantly higher self-esteem than women who did not quit ($M = 33.81$, $SD = 6.16$).

Women's number of reported depressive symptoms differed by smoking status, with nonsmokers reporting fewer depressive symptoms ($F(2,1028) = 39.81$, $p < .001$). Women who never smoked reported significantly fewer depressive symptoms ($M = 8.03$, $SD = 4.93$) than women who quit by delivery ($M = 10.36$, $SD = 5.59$) or women who did not quit by delivery ($M = 11.26$, $SD = 5.55$), but the two smoking groups did not differ significantly on number of reported depressive symptoms.

EAT-26 scores did not differ by smoking status ($F(2,1028) = 0.29$, $p = .75$). Nonsmokers' EAT-26 scores ($M = 1.19$, $SD = 3.59$) did not differ from EAT-26 scores of women who quit by delivery ($M = 1.35$, $SD = 4.51$) or women who did not quit by delivery ($M = 1.38$, $SD = 3.51$).

Logistic regression was performed to determine which of the variables of interest best predict whether women who smoke during pregnancy will quit. Of the 563 women who smoked at the first trimester interview, 227 quit prior to delivery. Of the variables of interest, only self-reported stress and self-reported self-esteem predicted quitting. Higher reported stress levels were related to a slightly lower likelihood of quitting (OR = 0.95, 95% CI 0.92, 0.98, $p = .003$) and higher reported self-esteem predicted a slightly higher likelihood of quitting (OR = 1.05,

95% CI 1.02, 1.08, $p = .001$). Depressive symptoms and EAT-26 scores did not predict quitting among women who were smoking in the first trimester of pregnancy.

Discussion

Smoking while pregnant is associated with an array of adverse health effects on the unborn fetus, and rates of this harmful habit in pregnant women are significantly higher than the national average in Southern and Central Appalachia (Bailey, 2015; "Tobacco use and pregnancy," 2017). A previous study, utilized TIPS in an attempt to reduce the number of pregnant smokers in the sample, and it revealed that women who successfully quit smoking before delivery had healthier birth outcomes (i.e. newborn health status, gestational age at delivery, birth size, and type of delivery) than women who did not quit (Bailey, 2015, p. 828). Instruments measuring psychosocial well-being and disordered eating patterns were implemented during the TIPS study by trained health educators over the course of 4 prenatal visits and smoking status was measured at each visit. Smoking status and birth outcomes were the focus of the TIPS study; as a result, the psychosocial well-being (i.e. stress, self-esteem, and depression) and disordered eating instruments were not analyzed in the original study.

The stress subscale of the PPP, the self-esteem subscale of the PPP, the CESD-10, and the EAT-26 from the TIPS study were analyzed in the current study to explore the relationships among stress, self-esteem, depression, disordered eating patterns, and efforts to quit smoking in pregnant women of South-Central Appalachia. Little existing literature examines the variables of interest in pregnant smokers, though relevant research generally supports the results of the current study. Increased levels of stress and low self-esteem have been shown to predict the likelihood of smoking. Findings from the current study are consistent with the results of the of previous literature, though much of the literature on stress, self-esteem, and smoking has been

conducted among adolescent populations. Like stress and self-esteem, existing research findings support the increased likelihood of smoking among individuals who have a history of depressive symptoms when compared with those who do not have a history of depressive symptoms, and this finding was partially supported by the current study. Women's depression scores did differ by smoking status, but depression was not a significant predictor of quitting likelihood according to logistic regression analysis. A strong relationship has been supported between smoking and disordered eating patterns among adolescents, though little research has explored these variables during pregnancy. The current study shows no relationship between smoking cessation rates and disordered eating patterns in these pregnant smokers. These results are inconsistent with the hypothesis and existing research on adolescents, but the differing demographic, specifically that the women were pregnant, does not make the discrepancy surprising. Previous research has shown that disordered eating tends to improve during pregnancy (Blais et al., 1999). This could be true in the current study.

Limitations of the current study include the selection of participants and the method in which the intervention was delivered. Participants were selected from five prenatal practices in South-Central Appalachia using convenience sampling methods. The intervention of the TIPS study was personalized for each participant; however, the lack of a script during interviews is another possible limitation due to lack of standardization.

The Appalachian population is a unique demographic in which rates of pregnant smoking are alarmingly high, and future research should be done to explore whether the discovered relationships between stress, self-esteem, and depression are true for populations in other areas. Additionally, while the primarily Caucasian demographic was representative of pregnant women in South-Central Appalachia, testing these hypotheses in a more diverse sample would be

beneficial in future research. For subsequent intervention programs, findings on stress and self-esteem may improve the quit rates of mothers and to improve infant health outcomes as a result. Pregnant smokers with high levels of stress or low self-reported self-esteem could benefit from interventions with resources tailored toward improving these psychosocial factors or from referral to a health care professional who specializes in the area, such as a social worker or therapist. Screening women for stress and self-esteem at prenatal healthcare visits would guide physicians in referring women with significant scores to intervention programs or mental health professionals. By addressing the underlying factors that affect psychosocial well-being in pregnant smokers, there is potential for a greater number of pregnant smokers to quit smoking before delivery if these factors are inhibiting their smoking cessation, and subsequently improve the health of their infants.

Conclusion

Researching the psychosocial well-being and disordered eating patterns of TIPS intervention participants revealed relationships among stress, self-esteem, depression and efforts to quit smoking in pregnant women of South-Central Appalachia. Variables that directly predicted quitting include self-reported stress and self-reported self-esteem. Results of the original TIPS study showed that the women who successfully stopped smoking had more positive birth outcomes compared with women who did not quit before delivery; therefore, understanding how psychosocial well-being relates to quit rates may help tailor future intervention programs. More research should be done with intervention programs targeted toward pregnant smokers with significantly high levels of stress and low levels of self-esteem. Adjusting interventions to address the improvement of psychosocial well-being is suggested to increase the rates of women who quit smoking and improve the health of their infants.

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