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Panic Disorder, Trait Anxiety, and Risk Drinking in Pregnant and Non-Pregnant Women

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Panic Disorder, Trait Anxiety, and Risk Drinking in Pregnant and Non-Pregnant Women

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

by
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Abstract

PANIC DISORDER, TRAIT ANXIETY, AND RISK DRINKING IN PREGNANT AND NON-PREGNANT WOMEN

by Sarah Meshberg-Cohen, B.A.

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

Virginia Commonwealth University, 2006

Major Director: Dace S. Svikis, Ph.D., Professor, Department of Psychology

Anxiety disorders, including Panic Disorder, and alcohol problems co-occur at greater rates than chance in the general population. It has also been suggested that alcohol is used to cope with anxiety symptoms, such as trait anxiety. While pregnancy may be a protective period against Panic Disorder and panic symptoms, trait anxiety remains relatively stable during pregnancy. The purpose of the present study was to examine differences in rates of current Panic Disorder, panic attacks, and trait anxiety in pregnant and non-pregnant women receiving care at an urban OB/GYN clinic. The study also examined correlates and differences in alcohol use and at-risk drinking among these women. In addition, the study assessed whether meeting diagnostic criteria for Panic Disorder, having had a recent panic attack, and trait anxiety influence alcohol use and at-risk drinking among women, and whether pregnancy status moderates these associations. Participants included pregnant (N = 412) and non-pregnant (N = 139) women receiving care at VCU Health Systems’ OB/GYN clinics. As predicted, pregnant women were less likely than non-pregnant women to have current Panic Disorder and/or a recent panic...
attack. There were no differences in trait anxiety levels between pregnant and non-pregnant women, and women with Panic Disorder and/or a recent panic attack had higher trait anxiety compared to women without Panic Disorder and/or a recent panic attack, regardless of pregnancy status. After controlling for demographics, Panic Disorder and higher trait anxiety were significant predictors of greater amounts of alcohol consumption in pregnant and non-pregnant women. In addition, non-pregnant women with high trait anxiety consumed greater amounts of alcohol than pregnant women with high trait anxiety. Furthermore, race and panic attacks were both predictors of being at-risk for problematic drinking. Overall, current study findings support the need to examine Panic Disorder, panic attacks, and trait anxiety, as potential risk factors for alcohol use among pregnant and non-pregnant women in the community. Study findings have important implications for assessment and treatment of panic, anxiety, and alcohol use.
Introduction

Epidemiological surveys and clinical studies have shown that alcohol disorders and anxiety disorders, including Panic Disorder, are associated and co-occur at greater rates than chance (Grant, Stinson, et al., 2004; Kushner, Abrams, Borchardt, 2000; Kessler, et al., 1997; Grant, et al., 1994; Regier, et al., 1990). While comorbid Alcohol Abuse and Dependence has been found to be more common among men with Panic Disorder (Yonkers, et al., 1998), women with Panic Disorder have a higher risk for comorbid Alcohol Abuse or Dependence (Piggott, 2003; Shuckit, et al., 1997; Kessler, et al., 1994).

Some studies have suggested that alcohol is used to cope with anxiety symptoms, such as trait anxiety (Kushner, Abrams, Thuras, & Hanson, 2000; Swendsen, et al., 2000). For example, Kushner and colleagues (2000) found that trait anxiety predicted a significant tendency to drink alcohol for anxiety management. Trait anxiety levels have also been found to correspond to severity of Alcohol Dependence, especially among female alcoholics (Roberts, Emsley, Peinaar, & Stein, 1999).

The importance of studying Panic Disorder and panic attacks, particularly as they relate to females, is evident from the higher prevalence rates across various studies. For example, epidemiological studies indicate a two to three-fold greater prevalence among females than males, and a higher persistence of symptomology among females (e.g., Reed & Wittchen, 1998).

Interestingly, some research suggests that pregnancy might be a protective period for women with Panic Disorder (Altemus & Brogan, 2004; Klein, Skrobala, & Garfinkel,
On the other hand, trait anxiety levels are found to remain relatively stable and fall within the normal range for women (i.e., not significantly higher or lower) during pregnancy (Monk, Myers, Sloan, Ellman, & Fifer, 2003; Sjöström, Valentin, Thelin, & Maršál, 1997; Albrecht & Rankin, 1989).

The importance of examining whether there is a relationship between current Panic Disorder, trait anxiety, and alcohol use among women is considerable when one takes into account the fact that women who consume similar amounts of alcohol as their male counterparts are more likely to endure alcohol-related problems (e.g., Chander & McCaul, 2003). Furthermore, the importance of considering current Panic Disorder and trait anxiety as possible risk factors for alcohol use (that either precede or result from its use) during pregnancy is considerable when one considers the various adverse affects of prenatal alcohol consumption on the mother and fetus, and the fact that no level of alcohol consumption during pregnancy has been deemed safe (e.g., Day & Richardson, 2004).

The purpose of the present study is to examine the relationships among current Panic Disorder, trait anxiety, and risk drinking in pregnant and non-pregnant women. We begin with an extensive review of the literature on Panic Disorder, trait anxiety, and alcohol problems, with an emphasis on research findings comparing women with alcohol problems, Panic Disorder, and trait anxiety. Then, in order to determine if Panic Disorder and trait anxiety affect women differently based on pregnancy status, the following hypotheses will be tested: 1) Pregnant women are less likely to have a Panic Disorder
diagnosis and/or a panic attack within the past month compared to non-pregnant women.  
2) There are no differences in trait anxiety levels between pregnant and non-pregnant 
women. 3) Non-pregnant and pregnant women with Panic Disorder and/or a panic attack 
within the past month will have higher trait anxiety compared to women without Panic 
Disorder and/or a panic attack in the past month. 4) Panic Disorder, panic attacks, and 
trait anxiety contribute significantly, above and beyond demographics, to the prediction 
of alcohol use and at-risk drinking, and pregnancy status will moderate these 
associations.
Review of the Literature

Panic Disorder

Definition of Panic Disorder

Anxiety has a major influence on human life. It is an aspect of almost every form of pathology, including physical, psychological, and social. Nearly every area of human activity is believed to be influenced by anxiety (Levitt, 1980). Although a certain amount of anxiety is needed for survival, when anxiety becomes excessive it can develop into an anxiety disorder. Approximately 30% of women will experience some type of anxiety disorder during their lifetime (Kessler, et al., 1994).

Panic Disorder is a severe and persistent anxiety disorder, associated with a high degree of subjective distress, functional impairment, and occupational and social disability (Goodwin, et al., 2005). According to the Diagnostic and Statistical Manual, Fourth Edition, Text Revision (DSM-IV-TR; American Psychiatric Association, 2000), the main aspect of Panic Disorder is the presence of persistent, unexpected panic attacks resulting in a minimum of 1 month of constant worry about experiencing an additional attack, distress about potential repercussions or consequences of the panic attacks, or a considerable behavioral change involving the attacks. While a panic attack is not a codable disorder by itself, the event of an unexpected panic attack must be included for a Panic Disorder diagnosis (with or without agoraphobia). Panic attacks are described as a discrete period of intense fear in the absence of real danger, accompanied by at least 4 of 13 somatic symptoms (e.g., involving cardiovascular, respiratory, neurological-like, and gastrointestinal symptoms, sweating, chills and/or hot flashes) or cognitive symptoms
(e.g., dizziness, unsteadiness, light-headedness, fear of losing control/dying/going crazy), usually reaching a crescendo within 10 minutes (Goodwin, et al., 2005; APA, 2000). A diagnosis is made with or without agoraphobia, depending on whether criteria for agoraphobia (anxiety about being in situations or places where escape may be hard or uncomfortable, or help might not be accessible if escape is desired) are met. Additionally, the diagnosis of Panic Disorder entails a complex set of differential diagnostic considerations, such as a direct physiological result of substance use (e.g., caffeine intoxication, a drug of abuse), a medical condition (e.g., hyperthyroidism), or when in the context of other psychiatric disorders (e.g., PTSD, social phobia) (APA, 2000).

Prevalence of Panic Disorder

Panic Disorder first appeared as a diagnosable disorder in the 1980 DSM-III (Katschnig & Amerig, 1998). Over the past 25 years, lifetime prevalence rates for Panic Disorder have ranged from 1 to 4.7%, and women are more commonly diagnosed with the disorder than are men (e.g., Kessler, Berglund, et al., 2005; Katschnig & Amering, 1998; Reed & Wittchen, 1998). Epidemiologic studies indicate that Panic Disorder usually arises in late adolescence or early adulthood (e.g., Reed & Wittchen, 1989).

To date, three major epidemiological studies have examined prevalence rates for Panic Disorder using DSM nomenclature. The first, the Epidemiological Catchment Area (ECA) study used DSM-III diagnostic criteria for Panic Disorder (Gelenter, et al., 1992). In-person interviews from 1980 to 1983 of persons 18 years of age and older (n = 20,861) in five metropolitan areas throughout the United States (Eaton, et al., 1989)
revealed lifetime prevalence rates of 1.6%, 12-month prevalence rates of 0.9%, and 1-month prevalence rates of 0.5% for Panic Disorder (Eaton, Dryman, & Weissman, 1991). Females had higher 12-month prevalence rates of Panic Disorder than males (0.76% versus 0.30% per 100 persons) (Eaton, et al., 1989).

Ten years later, between 1990 and 1992, the National Comorbidity Survey (NCS), which used DSM-III-R criteria for Panic Disorder, conducted the first nationally representative epidemiological study of the entire continental United States. Data from in-person interviews of people ages 15 to 54 years old (n = 5388), revealed lifetime prevalence rates of 3.5%, 12-month prevalence rates of 2.3%, and 1-month prevalence rates of 1.5% for Panic Disorder (Kessler, et al., 1994; Eaton, Kessler, Wittchen, & Magee, 1994). Females had higher prevalence rates than males for both lifetime (5.0% versus 2.0%) and 12-month (3.2% versus 1.3%) Panic Disorder. Additionally, female preponderance increased even more among Panic Disorder with Agoraphobia compared with males (7.0% versus 3.5%, respectively) (Kessler, et al., 1994).

Data from NCS also showed differences in Panic Disorder and panic attacks based on educational achievement. Those with lower educational achievement (under 12 years of education completed) were over 10 times more likely to experience Panic Disorder, and over four times more prone to suffer from a panic attack, than those with greater educational achievement (16 or greater years of education completed) (Eaton, et al., 1994).

Finally, the National Comorbidity Survey Replication (NCS-R), conducted from 2001 to 2003, included interviews with a nationally representative sample (n = 9,282),
ages 18 years and older, using DSM-IV Panic Disorder criteria (Kessler, Berglund, et al., 2005). The NCS-R data showed a lifetime prevalence of 4.7% (Kessler, Berglund, et al., 2005) and a 12-month prevalence of 2.7% (Kessler, Chiu, et al., 2005). Almost half (44.8%) of the cases meeting criteria for Panic Disorder were classified as serious (Kessler, Chiu, et al., 2005). Projected lifetime risk for Panic Disorder, or the estimated prevalence of the population who will have the disorder at some point before their life ends, based on NCS-R age-of-onset distributions, revealed a 6.0% risk for Panic Disorder by age 75 years (Kessler, Berglund, et al., 2005).

A cross-national study investigating the epidemiology of Panic Disorder found comparable lifetime prevalence with those of US rates across 10 different countries. Prevalence rates ranged from 1.4% to 2.9%, with consistently higher rates of Panic Disorder in females than in males for every country (Weissman, et al., 1997).

**Women and Panic Disorder**

The importance of studying Panic Disorder and panic attacks, particularly as they relate to females, is evident from the higher prevalence rates across various studies. For example, the above statistics indicate a two to three-fold greater prevalence among females than males, and a higher persistence of symptomology among females (e.g., Reed & Wittchen, 1998). While these statistics indicate that prevalence differs by gender, variations in symptoms between females and males have also been suggested (Yonkers & Howell, 2003).

Females with Panic Disorder experience some symptoms more often than males with Panic Disorder, specifically respiration-related symptoms (shortness of breath,
feeling faint, feeling smothered, choking or difficulty swallowing, and nausea). In contrast, men are more likely to identify symptoms of sweating and stomach pain (Sheikh, Leskin, & Klein, 2002).

Compatible with these findings, Papp and colleagues (1997) found that women with Panic Disorder had greater carbon dioxide (CO₂) sensitivity, as depicted by their substantially higher respiration rate. The greater proclivity for women to have respiratory symptoms is especially interesting since results from panic provocation studies show that individuals with Panic Disorder have more panic attacks and more anxiety during CO₂ inhalation relative to non-panic disordered individuals (e.g., Gorman, et al., 2005; Sheikh, et al., 2002; Papp, et al., 1997). As such, a false alarm suffocation theory by Klein (1993) suggests that increases in plasma CO₂ (pCO₂) are main triggers for the spontaneous panic attacks seen in Panic Disorder. Increases in pCO₂ trigger the false alarm suffocation by signaling ventilatory deficiency or asphyxiating conditions (Klein, Skrobala, & Garfinkel, 1995).

Prospective longitudinal data on Panic Disorder revealed that males and females also have a different course of illness. Five years of follow-up data from Harvard/Brown Anxiety Disorders Research Program (HARP) showed that females were twice as likely as males to suffer a relapse after remission (82% and 51%, respectively) (Yonkers, et al., 1998). Eight years of follow-up with HARP revealed that, while both genders were equally likely to improve in their illness, cumulative relapse was three-fold higher in females compared to males (64% and 21%, respectively) (Yonkers, Welte, & Hirsh, 2003).
Pregnancy and Panic Disorder

Fluctuations in hormone and menstrual cycles throughout the female lifecycle appear to influence the course of Panic Disorder in women. Even though childbirth may generate the onset of Panic Disorder in some women, research on the influence of pregnancy on preexisting Panic Disorder has shown mixed results (Rubinchik, Kablinger, & Gardner, 2005).

Some research suggests that pregnancy might be a protective period for women with Panic Disorder (Altemus, & Brogan, 2004; Klein, Skrobala, & Garfinkel, 1995; Cowley & Roy-Byrne, 1989; George, Ladenheim, & Nutt, 1987). In contrast, postpartum may be a worsening period for the disorder (Klein et al., 1995). For example, Klein and colleagues (1995) found that women with active Panic Disorder improved during pregnancy. There was a drastic decrease in panic frequency and intensity between the prepregnancy stage and the first trimester in the majority of patients; and panic frequency and intensity continued to decrease significantly between the first and second trimesters. However, a significant increase in panic intensity and frequency between the third trimester and a one-year postpartum follow-up was also found (Klein, et al., 1995).

While some reports suggest that pregnancy guards against Panic Disorder, others warn that not all panic patients improve during pregnancy. For example, Cohen and colleagues (1996) found that pregnancy did not protect against panic, particularly for women with more severe histories of Panic Disorder. Women in their study (1996) continued to meet criteria for Panic Disorder during all trimesters; symptoms even
continued for some of the patients who were using antipanic medication treatment. These authors suggested, however, that women with milder panic symptoms might experience improvements (Cohen, et al., 1996).

Hormonal changes might contribute to the suppression of stress responses during pregnancy. For example, respiratory rate increases during pregnancy, possibly due to an increase in circulating progesterone, contribute to maintained decreases in pCO$_2$ levels as pregnancy progresses (Altemus & Brogan, 2003). As noted above, increases in pCO$_2$ can trigger panic, and are thought to increase women’s proclivity to Panic Disorder; thus, maintained decreases in such levels during pregnancy may serve to protect against panic.

**Trait Anxiety**

*Definition of Trait Anxiety*

While anxiety has always been a relevant aspect in peoples’ lives, anxiety was not acknowledged as a distinct human condition until just prior to the beginning of the twentieth century. Freud first suggested a role for anxiety in personality theory. He believed that anxiety played an important part in the etiology of neurosis. Then, in the late 1950s, the concepts of state and trait anxiety emerged through the factor analytic studies of Cattell and Scheier. They made a distinction between anxiety as a mood and as an attribute, formulating the terms state (temporary) and trait (proneness) anxiety (Levitt, 1980).

In the 1960s, Spielberger (1966) began elaborating on the terms developed by Cattell and Scheier. Since that time, Spielberger has helped to make the differences between trait anxiety and state anxiety a fundamental issue in the investigative study of
anxiety (Levitt, 1980). Trait anxiety suggests relatively stable individual differences in anxiety-proneness. Those who are anxiety-prone are predisposed to experience higher levels of state anxiety more frequently and under a relatively wider range of circumstances than their peers. Unlike the transitory conditions of an emotional state, anxiety as a trait is a comparatively stable characteristic (Levitt, 1980). In essence, trait anxiety refers to the differences among individuals in their propensity to identify stressful conditions as unsafe or threatening, and to react to such conditions with elevations in their amount of state anxiety (Spielberger, 1983).

**Women and Trait Anxiety**

While most studies of trait anxiety levels in the general population have found no gender differences (e.g., Weekes, MacLean, & Berger, 2005; Turgeon, Marchand, & Dupuis, 1998; Novy, Nelson, Goodwin, & Rowzee, 1993; Chambless & Mason, 1986; Spielberger, 1983), a couple of studies have indicated slightly higher trait anxiety levels for females compared with males (Weekes, et al., 2005; Spielberger, 1983). For example, while normative data collected for Spielberger’s State-Trait Anxiety Inventory revealed no gender differences on trait anxiety in working adults and high school students, normative data with female military recruits and college students showed slightly higher trait anxiety levels than their male counterparts (Spielberger, 1983).

In a study that investigated whether stress predicted health symptoms differently among genders, Weekes and colleagues (2005) found that while trait anxiety alone was not predictive of negative health symptoms, when a Perception composite (e.g., trait anxiety, state anxiety, depression, perceived stress) and an Exposure composite (e.g.,
hassles, stressors) were created, both perceived stress and exposure to stress were significantly related with health problems for females. However, only exposure to stress, but not perceived stress, was predictive of health problems for males (Weekes, et al., 2005).

Research on trait anxiety and gender differences among people with Panic Disorder have also revealed inconsistencies. While one study found significantly higher trait anxiety levels among women with Panic Disorder with Agoraphobia compared to men (Chambless & Mason, 1986), these findings have not been replicated in other studies. For example, Turgeon and colleagues (1998) and Oei, Wanastall, and colleagues (1990) reported comparable trait anxiety levels among men and women with Panic Disorder with Agoraphobia. Likewise, Foot and Kosziki (2004) found no differences in gender for trait anxiety among Panic Disorder patients. Finally, although trait anxiety levels were found to be predictive of anxiety disorders in adolescents, this relationship between trait anxiety and anxiety disorders did not differ as a function of gender (Hishinuma, et al., 2001).

**Pregnancy and Trait Anxiety**

According to the theoretical distinction made between trait and state anxiety, trait anxiety should remain relatively stable during pregnancy. Compatible with this theory, trait anxiety levels are found to remain relatively stable and fall within the normal range for women (i.e., not significantly higher or lower) during pregnancy (Monk, Myers, Sloan, Ellman, & Fifer, 2003; Sjöström, Valentin, Thelin, & Maršál, 1997; Albrecht & Rankin, 1989). Importantly, prenatal and postnatal trait anxiety levels have also been
found to remain relatively stable (Coplan, O’Neil, & Arbeau, 2005). Nevertheless, even with non-significant differences in trait anxiety among pregnant and non-pregnant women, relationships between trait anxiety and complications in pregnancy, labor, and the newborn, indicates that trait anxiety can be an important factor to consider when studying women during pregnancy (e.g., Monk, et al., 2003; Sjöström, et al., 1997; Pond & Kemp, 1992; Albrecht & Rankin, 1989).

Trait anxiety in pregnant women has also been linked to psychosocial variables such as social support and self-confidence. Albrecht and Rankin (1989) found that women with high trait anxiety had substantially less social support systems during pregnancy than those with low trait anxiety. These findings are especially important because social support can help ease the acquisition of the maternal role (Rubin, 1975) and help to manage stress and birth complications (Norbeck & Tilden, 1983).

Self-confidence is another important psychosocial variable found to relate to trait anxiety during pregnancy. Self-confidence during pregnancy was defined by Williams and colleagues (1987) as a mother’s perceived belief about her capability to care for her baby. Pond and Kemp (1992) found that women with high trait anxiety had significantly lower self-confidence than women with low trait anxiety, in both adolescent and adult mothers during pregnancy.

In addition to the relationship between high trait anxiety and psychosocial variables during pregnancy, trait anxiety has been shown to influence fetal behavior and development during pregnancy, and may be relevant due to the implications it can have on development. Recent research has indicated a relationship between maternal trait
anxiety and fetal behavior, which can be directly observed during the fetal period. For example, Monk and colleagues (2003) found a significant relationship between a mother’s trait anxiety and fetal heart rate responses. Specifically, as trait anxiety levels increased, fetal heart rate increased during a mother’s exposure to a stress-eliciting challenge. Also, fetuses of more highly anxious mothers showed greater heart rate decreases during the mother’s recovery from the challenge (Monk, et al., 2003).

Studies have also linked fetal hemodynamics (i.e., forces involved in fetal circulation of the blood) with pregnant women’s trait anxiety. For example, using a non-invasive Doppler ultrasound, Sjöström and colleagues (1997) studied maternal trait anxiety and fetal hemodynamics. Lower vascular resistance in the fetal middle cerebral artery, resulting in increased blood flow to the fetal brain, and greater vascular resistance in the umbilical artery were found in fetuses of women with high trait anxiety. This finding signified changes in blood flow distribution in the fetus, and is important because this “redistribution of blood flow might indicate that fetuses of mothers with high trait anxiety scores suffer relative oxygen deprivation” (154).

In addition to affecting fetal behavior, heart rate, and blood flow, maternal trait anxiety may impact infant temperament after delivery (Austin, Hadzi-Pavlovic, Leader, Saint, & Parker, 2005; Coplan, et al., 2005). Austin and colleagues (2005) found that prenatal trait anxiety, but not depression, was predictive of maternal reports of difficult temperament in infants at 4 and 6 months. In this study, trait anxiety was a distinct risk factor for difficult temperament. Additionally, if trait anxiety is accepted as a stable characteristic, then its influence on infant temperament should continue into the
postpartum period. Supporting this, Coplan and colleagues (2005) assessing maternal
trait anxiety three months after pregnancy, found a significant positive relationship
between high trait anxiety and infant distress to limitations and novelty, as well as a
negative relationship among trait anxiety with soothability, in infants three months of
age.

**Trait Anxiety and Panic Disorder**

Trait anxiety is a recommended psychological concept for the standardized
evaluation of Panic Disorder for research purposes (Oei, Evans, & Crook, 1990). Across
various studies, scores on trait anxiety measures have been found to be significantly
higher among Panic Disorder patients than what has been reported for normative samples
(Chambers, Power, & Durham, 2004; Kennedy, Schwab, Morris, & Beldia, 2001). While
Kennedy and colleagues (2001) found that anxiety disorder patients with more acute
illness demonstrated greater differences in trait anxiety, trait anxiety did not necessarily
distinguish between various anxiety disorders. Furthermore, trait anxiety has shown to
correlate highly with other anxiety and depression measures in Panic Disorder patients
(Kennedy, et al., 2001). Chambers and colleagues (2004) also found greater levels of
trait anxiety were strongly associated with both anxiety and depressive diagnosed
patients. Additionally, they found that patients with high trait anxiety were likely to
suffer a general vulnerability for anxiety and depression, with a tendency toward more
comorbid disorders in the long-run.

Muris, Merckelbach, and Rassin (2000) found that trait anxiety significantly
correlated with most panic measures (i.e., agoraphobia, misinterpretation of bodily
feelings, and fear of bodily sensations). Data also showed that highly trait anxious individuals endured more physiological symptoms compared to those with low trait anxiety.

In addition, research suggests that trait anxiety may help with the detection of people at-risk for Panic Disorder. For instance, a study on the development of panic symptoms, attacks, and disorder, found trait anxiety was a useful predictor for panic symptomology and Panic Disorder in an undergraduate student population that was re-contacted 11 years after original data collection (Plehn & Peterson, 2002). Specifically, baseline data \( n = 505 \) indicated that trait anxiety and anxiety sensitivity (the notion that anxiety-related physical feelings are dangerous) were significantly correlated with Panic Disorder at baseline. Data collected at baseline also showed trait anxiety to be significantly correlated with the development of panic symptoms, and to be an independent predictor for Panic Disorder at 11-year follow up.

Alcohol Problems

Definition of Alcohol Abuse and Dependence

According to the DSM-IV-TR (APA, 2000), alcohol is the most commonly used drug of abuse and a source of significant morbidity and death. Approximately 90% of adults in the United States have had experience with alcohol during the course of their lifetime, and many people (30% of females and 60% of males) have experienced at least one undesirable alcohol-related life incident (e.g., drinking and driving, neglecting work or school because of a hangover). While most people learn to control their drinking, especially after such negative life events, others are unfortunately unable to moderate
alcohol consumption, thus leading to the development of an alcohol use disorder.

Alcohol use disorders include Alcohol Abuse and Alcohol Dependence.

Alcohol Abuse is a condition characterized by recurrent drinking resulting in clinically significant impairment or distress, which includes at least one of the following within a 12-month period: (1) persistent alcohol use resulting in failure to fulfill major role obligations at school, work, or home; (2) persistent alcohol use despite constant or recurring alcohol-related social or interpersonal problems because of the effects of alcohol; (3) alcohol-related legal problems; (4) recurrent drinking in hazardous situations (APA, 2000).

Alcohol Dependence is a condition characterized by impaired control over drinking resulting in clinically significant impairment or distress, which includes three (or more) of the following during the same 12-month period: (1) withdrawal symptoms; (2) tolerance to alcohol; (3) compulsive drinking for longer than was intended; (4) inability to cut down or control drinking; (5) preoccupation with drinking (majority of time spent obtaining, drinking, or recovering from alcohol); (6) important recreational, occupational, and social activities are stopped or reduced because of drinking; (7) continued drinking despite continual physical or psychological problems caused or exacerbated by drinking (APA, 2000).

**Prevalence of Alcohol Use Disorders**

Alcohol use disorders are among the most common psychiatric disorders worldwide (Grant, Dawson, et al., 2004; World Health Organization, 2001). The United States has witnessed an increase in 12-month prevalence rates of alcohol use disorders,
with the highest prevalence found among males, younger cohorts, and those of White or Native American race-ethnicity (Grant, Dawson, et al., 2004).

Recently, the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC; Grant, Dawson, et al., 2004), which is the largest comorbidity survey to date, conducted in-person interviews using DSM-IV nomenclature with people 18 years and older (n = 43,093) and found that nearly 17.6 million American adults (8.5%) have been diagnosed with Alcohol Abuse or Dependence within the prior 12-months. Statistics showed that a greater amount of people met criteria for Alcohol Abuse (4.65%) than Alcohol Dependence (3.81%). One-year prevalence rates of Alcohol Abuse and Dependence together was significantly higher among males (12.35%) than females (4.87%). Data also indicated that those in the youngest cohorts (aged 18 to 44 years old) had the highest prevalence of Alcohol Abuse and Dependence among both males (18.04%) and females (7.88%).

In addition to gender, prevalence among race-ethnicity varied for both Alcohol Abuse and Dependence. NESARC data indicated that Whites (5.10%) and Native Americans (5.75%) had significantly higher rates of Alcohol Abuse than Blacks (3.29%), Hispanic/Latinos (3.97%), and Asians (2.13%). Similarly, Whites (3.83%), Native Americans (6.35%), and Hispanics/Latinos (3.95%) had significantly higher rates of Alcohol Dependence than Asians (2.41%) (Grant, Dawson, et al., 2004).

Prevalence rates of alcohol use disorders found in NESARC were significantly increased from those reported in the 1991-1992 National Longitudinal Alcohol Epidemiological Survey (NLAES; Grant, et al., 1994), which used identical survey
designs and DSM-IV nomenclature. This study found a 12-month prevalence of Alcohol Abuse and Dependence of 7.41%. Other large national epidemiologic studies of psychiatric disorders, including alcohol use disorders, reported 12-month prevalence rates of 6.66% (ECA; Eaton, et al., 1989), 9.7% (NCS; Kessler, et al., 1994), and 4.4% (NSC-R; Kessler, Chiu, et al., 2005).

**Differences in Race/Ethnicity among Women**

The 2001-2002 NESARC revealed that the prevalence of Alcohol Abuse among women differs by race. Specifically, recent epidemiological data indicated that White females (2.92%) had a significantly higher prevalence rate of Alcohol Abuse than their Black (1.41%) female counterparts (Grant, Dawson, et al., 2004). Research also suggests that most African-American women abstain (45 to 60%) or drink infrequently (34 to 36%), and that the rate of abstainers increases with aging (over 40 years old) (Collins & McNair, 2002). In addition to racial differences in prevalence rates of risk drinking, research suggests there may also be racial differences in drinking patterns in women (Herd, 1997).

For example, Herd (1997) examined racial differences in norms and drinking patterns in African American ($n = 1,224$) women and Caucasian American ($n = 1,034$) women, and found that African American women endorsed conservative versus liberal drinking norms for women, and were significantly less likely than Caucasian American women to report permissive drinking standards for women. Additionally, women who were younger, Caucasian, unemployed, and who endorsed liberal drinking standards in
general and for women, and were significantly more likely to be drinkers compared to other women (Herd, 1997).

Women and Alcohol

Even though the prevalence of alcohol use disorders is higher among males than females, women are particularly susceptible to the harmful consequences of alcohol (Chander & McCaul, 2003; York, Welte, & Hirsh, 2003). For example, females who drink heavily are more likely to endure alcohol-related health problems (e.g., alcohol liver disease), despite consuming lower quantities of alcohol over a shorter timeframe than male alcoholics (e.g., National Institute on Alcohol Abuse and Alcoholism [NIAA], 1999; Frezza, et al., 1990;). Females become more impaired and achieve higher blood alcohol concentrations (BACs) than males after drinking equivalent amounts of alcohol, even when controlling for body weight (e.g., Mumenthaler, Taylor, O'Hara, & Yesavage, 1999; Frezza, et al., 1990).

The reason for increased alcohol bioavailability in females is due to the fact that ethanol (pure alcohol) is diffused in body water; since females have relatively less water and more body fat compared to males of the identical body weights, women attain higher peak BACs than males with the same doses of alcohol (Frezza, et al., 1990). In addition, and again as a result of increased bioavailability among females, several studies report that females have an increased vulnerability to alcohol-related liver disease (e.g., Gavaler, 1982), heart disease (Urbano-Márquez, et al., 1995), brain damage (e.g., Hommer, Momenan, Kaiser, & Rawlings, 2001), and to mortality (e.g., Holman, English,
Liver disease is a major concern of long-term alcohol use, and has been correlated with illness and mortality (Hall, 1992; Arria, Tarter, & Van Thiel, 1991; Gavaler, 1982). At least 95% of ethanol consumed is metabolized in the liver (Gavaler, 1982). Interestingly, while higher prevalence rates of alcohol cirrhosis of the liver are found in males, most likely due to the increased likelihood that males will be heavy drinkers (Arria, et al., 1991), development of severe liver damage occurs much more rapidly among heavy drinking females than among their heavy drinking male counterparts (Hall, 1992; Aria, et al., 1991). Moreover, higher rates of alcoholic hepatitis are found among females than males, and females are more likely to die from alcoholic cirrhosis than males (Hall, 1992).

While the liver is one of the first organs affected, excessive alcohol consumption can also have detrimental affects on the heart. Heart disease has been correlated with extreme alcohol use, and the amount of alcohol causing cardiac harm has been found to be significantly less for females compared to males; thus, research indicates alcoholic females are more sensitive to alcohol-related heart disease compared to males. For example, Urbano-Márquez and colleagues (1995) found equivalent rates of alcohol-related cardiomyopathy and myopathy among males and females, suggesting an increased female susceptibility to alcohol-induced cardiac impairment given that the average lifetime alcohol consumption of females was 60% the average lifetime alcohol consumption of males.
In addition to the increased susceptibility of alcohol-related liver and heart disease, excessive alcohol consumption has harmful effects on the brain, which may occur more rapidly, and at smaller doses among females than males (Schweinsburg, et al., 2003; Hommer, et al., 2001). For example, Hommer and colleagues (2001) evaluated brain volumes of both alcoholics and nonalcoholics, and found that female alcoholics had considerably smaller volumes of gray and white matter than female nonalcoholics. While significant differences were also present among alcoholic and nonalcoholic males, these differences were of smaller magnitude and significance than the differences among alcoholic and nonalcoholic females.

In addition to an increased susceptibly of alcohol-related disease, studies indicate an increased risk of mortality among heavy drinking females compared to males (Holman, et al., 1996). For example, Holman and colleagues (1996) reported that the correlation to mortality among heavy drinking females is roughly two standard drinks per day less than males. In a prospective study (n = 128,934), Klatsky and Armstrong (1993) investigated the risk of unnatural death (i.e., motor vehicle accidents, suicide, and violence), and found a relation between alcohol consumption of six or more drinks per day and an increased risk of unnatural death. Additionally, females who drink heavily (six or more drinks per day) were at a higher risk than males and non-drinking females for motor vehicle accidents, homicide, and other unnatural deaths. This gender difference was not consistent at lower levels of daily alcohol consumption.
Pregnant Women and Alcohol Consumption

Alcohol use during pregnancy is a major public health concern in the United States (e.g., Flynn, Marcus, Barry, & Blow, 2003; Hankin, McCaul, & Heussner, 2000). While alcohol consumption is so common in our society, its use during pregnancy can have various adverse affects on the mother and fetus, and no level of alcohol consumption during pregnancy has been deemed safe (e.g., Day & Richardson, 2004).

Heavy maternal alcohol intake has been linked with numerous detrimental effects on the fetus including spontaneous abortion, perinatal mortality, congenital abnormalities, and mental retardation (Kruse, 1984). One of the most severe outcomes caused by heavy alcohol use during pregnancy is fetal alcohol syndrome (FAS), which is characterized by central nervous system disorders, craniofacial malformations, and growth retardation (Pietrantoni & Knuppel, 1991). Even though FAS is completely preventable, according to the Center for Disease Control (CDC, 2004), it is one of the leading causes of mental retardation in the United States, with prevalence rates that range from 2 to 25 per 10,000 live births throughout the United States (CDC, 2005).

While research has shown that six standard daily drinks per week can cause FAS (Jacobson & Jacobson, 1994; Kaskuntas, 2000), lighter drinking, even one to two drinks per day, can lead to negative fetal alcohol effects (FAE), such as low birth weight, smaller length at birth, and small head circumference (Day & Richardson, 2004). Deleterious effects have also been found in infants exposed to prenatal alcohol levels that were considerably less than one daily drink. For example, the Maternal Health Practices and Child Development (MHPCD) Project found that women who consumed less than
one daily drink of alcohol during early pregnancy had a greater risk of having a baby with low birth weight and growth deficits in early infancy, and these deficits persisted during childhood in low-income populations (Day & Richardson, 2004). MHPCD researchers found a dose-response association between prenatal alcohol use and fetal outcomes. Data showed an enduring indication of alcohol exposure during pregnancy, therefore indicating no safe level of alcohol consumption during pregnancy.

Even with these well-known negative effects, many women continue to consume alcohol during pregnancy. Data suggests that 14% to 20% of women consume alcohol during pregnancy (Morse & Hutchins, 2000), and according to the 2002 Behavioral Risk Factor Surveillance System (BRFSS), nearly 2% of women report binge drinking or drinking frequently during pregnancy (CDC, 2004).

An important factor when considering alcohol use during pregnancy is that in the earlier stages of pregnancy, many women who consume alcohol are unaware of their pregnancy status, thus increasing the likelihood of exposing the fetus to alcohol. According to statistics, half of US pregnancies are unplanned (Forrest, 1994). These rates, together with results from the Behavioral Risk Factor Surveillance System (BRFSS), which showed 51% of American women of childbearing age (18 to 44 years old) reported alcohol consumption in the past month (CDC, 1997), underscores the importance of recognizing moderate to heavy alcohol use among women in the early stages of unrecognized pregnancy. Accordingly, the National Maternal and Infant Health Survey (NMIHS; Floyd, Decouflé, & Hungerford, 1999) examined alcohol use prior to pregnancy, and found 45% of women reported alcohol use during the three months prior
to pregnancy. More alarming, is that a large portion of these women were unaware of their pregnancy until their fourth week (60%) or sixth week (30%) of pregnancy. NMIHS data revealed that after pregnancy recognition, alcohol use declined. Specifically, while 5% of the women consumed six or more drinks per week before realizing they were pregnant, only 0.7% consumed that amount after pregnancy recognition. In addition, only 21% of the original 45% continued alcohol use after pregnancy recognition (Floyd, Decouflé, & Hungerford, 1999).

While numerous studies have focused on the adverse physical and neurological effects of alcohol on the fetus and developing child, research has also shown adverse psychological effects on offspring exposed to prenatal alcohol. Emotional functioning, such as depression, has been found among children exposed to alcohol prenatally (O'Connor & Kasari, 2000; Chassin, Pitts, DeLucia, & Todd, 1999). For instance, O'Connor and Kasari (2000) found prenatal alcohol exposure, child gender (specifically girls), and mother's depression were all related with child-reported depressive symptoms. In addition, authors found a 19% depression rate among the alcohol exposed children, which is much higher than the 1% rate of depression that is normally found among children of the same age. Therefore, the importance of detection and treatment of Alcohol Abuse and Dependence among pregnant women is becoming increasingly pertinent.

Thus, treatment, including screening and assessment, are important in pregnant women because of the well-known dangers (described above) to expectant mothers and their infants from alcohol. It is well-documented that the safest advice is to avoid
alcohol use before conception and during pregnancy. However, despite increased awareness of the detrimental effects of prenatal alcohol use, many women still consume alcohol while pregnant. Unfortunately, it is difficult to detect the risk of heavy drinking since laboratory tests are unavailable and accurate histories of alcohol consumption can be complicated by denial from the mothers. For example, Alvik and colleagues (2006) found women reported higher rates of alcohol consumption during pregnancy when asked postpartum rather than prenatally. Heavy drinkers are more likely to underreport current alcohol use during pregnancy compared to lighter drinkers, who were found to be less biased (Alvik, Haldorsen, Groholt, & Lindernann, 2006). In addition, because Alcohol Abuse and Dependence are chronic relapsing psychiatric disorders that do not suddenly cease upon pregnancy awareness, it is important that physicians are aware that pregnant women often underreport all alcohol use (Sokol, Martier, & Ager, 1989). Fortunately, some brief screening measures, described later in the methods section of this paper, have been developed for the detection of risk-drinking in both pregnant and non-pregnant women.

Anxiety and Alcohol Problems

Comorbid Panic Disorder and Alcohol Disorder Prevalence

Researchers find that problems related to alcohol and anxiety have a tendency to occur within the same person (comorbidity) (Kushner, Abrams, Borchardt, 2000). Epidemiological surveys and clinical studies have shown that alcohol use disorders and anxiety disorders, including Panic Disorder, are strongly associated and widespread throughout the general population (Grant, Stinson, et al., 2004; Kushner, Abrams, &
Borchardt, 2000; Kessler, et al., 1997; Grant, et al., 1994; Regier et al., 1990). These studies reveal that alcohol use disorders and Panic Disorder co-occur at greater rates than chance (Kessler, et al., 1997).

Major epidemiologic studies, such as the 1980-1984 ECA and 1990-1991 NCS, indicate relatively higher risks for comorbid lifetime prevalence of an alcohol use disorder given the presence of Panic Disorder. For example, the ECA showed that the risk of having an Alcohol Abuse or Dependence diagnosis was over two times (odds ratio; OR = 2.6) more likely to occur among individuals with Panic Disorder. Individuals with Panic Disorder were over three times (OR = 3.3) more likely to have Alcohol Dependence compared to people in the general population (Regier, et al., 1990). The NCS revealed similar comorbidity to that of the ECA.

A risk for lifetime co-occurrence of alcohol use disorders and Panic Disorder in the NCS revealed a 12.0% prevalence of Panic Disorder in women with Alcohol Dependence (OR = 2.98) and 3.6% prevalence of Panic Disorder in men with Alcohol Dependence (OR = 2.27). Thus, the risk of comorbid Alcohol Dependence was almost three times greater among women with Panic Disorder (OR = 2.98) and over two times higher among men with Panic Disorder (OR = 2.27) than the risk of Alcohol Dependence found in the general population (Kessler, et al., 1997). More recent epidemiologic studies also found a strong co-occurrence between alcohol use disorders and Panic Disorder.

The 2002 NESARC classified both independent and alcohol-induced disorders with the DSM-IV nomenclature to discern whether Panic Disorder and alcohol use
disorders are related, even when alcohol-induced disorders are excluded. The NESARC showed the 12-month prevalence of co-occurring alcohol use disorder with Panic Disorder was significant. Individuals with a 12-month alcohol use disorder presented an increase in the odds of being diagnosed with Panic Disorder with or without Agoraphobia (OR = 2.5 and 2.0, respectively). Having Alcohol Dependence presented a particularly greater increase in the odds of being diagnosed with Panic Disorder with or without Agoraphobia (OR = 3.6 and 3.4, respectively). Among respondents with 12-month Panic Disorder, 18.81% of individuals with Agoraphobia and 15.29% of individuals without Agoraphobia had an alcohol use disorder (Grant, Stinson, et al., 2004).

Women, Anxiety, and Alcohol Problems

Comorbid Panic Disorder and Alcohol Disorder among Women

Important gender differences have been noted in the epidemiology of alcohol and comorbid psychiatric disorders, including temporal sequencing (Chander & McCaul, 2003). For instance, data from International Consortium Psychiatric Epidemiology (ICPE), which is a cross-national study of patterns of comorbidity, indicated that anxiety disorders may play a part in the etiologic role for women but not for men (Zilberman, Tavares, Blume, & el-Guebaly, 2003; Chander & McCaul, 2003; Merikangas, et al., 1998). However, in one study, Cox and colleagues (1993) found males with Panic Disorder, but not their female counterparts, reported significantly more weekly alcohol intake, and considered self-medication with alcohol to be more helpful. While comorbid Alcohol Abuse and Dependence has been found to be more common among men with Panic Disorder (Yonkers, et al., 1998) women with panic disorder have a higher risk for
comorbid Alcohol Abuse or Dependence relative to women without Panic Disorder (Piggott, 2003; Schuckit, et al., 1997; Kessler, et al., 1994).

Lifetime prevalence for independent Panic Disorder is significantly higher in Alcohol Dependent individuals than controls, especially among women. For example, Schuckit and colleagues (1997) administered in-person structured interviews to 2713 alcoholic individuals and 919 non-alcoholic individuals (controls), and found enhanced risks for Panic Disorder among alcoholic women compared with non-alcoholic women. Specifically, independent Panic Disorder diagnosis was identified in 6.8% of Alcohol Dependent women compared to 1.3% in non-alcoholic women. Early onset of Panic Disorder (i.e. occurring prior to the onset of Alcohol Dependence) was found in 5.2% of alcoholic women. In all, 7.7% of alcoholic women compared to 3.9% of alcoholic men had a Panic Disorder diagnosis either within or outside the context of Alcohol Dependence (Schuckit, et al., 1997).

Trait Anxiety and Alcohol among Women

The mechanism of co-morbid Panic Disorder and alcohol use disorder have been controversial, and comprise the following models: (1) anxiety disorder initiates alcohol use disorder; (2) alcohol use disorder initiates anxiety disorder; (3) a causal third factor predisposes both types of disorders (Zimmermann, et al., 2003; Kushner, Abrams, & Borchardt, 2000).

Some studies have suggested a "self-medication view" (anxiety provokes alcoholism), indicating that alcohol is used to cope with anxiety symptoms, such as trait anxiety (Kushner, Abrams, Thuras, & Hanson, 2000; Swendsen, et al., 2000). For
example, Kushner and colleagues (2000) found that trait anxiety predicted a significant
tendency to drink alcohol for anxiety management. Trait anxiety levels have been found
to correspond to severity of Alcohol Dependence, especially among female alcoholics
(Roberts, Emsley, Peinaar, & Stein, 1999). King and colleagues (2003) found that female
alcoholics had significantly higher trait anxiety levels compared to male alcoholics,
problematic/heavy alcohol drinkers, and light social drinkers. A relation between trait
anxiety and alcohol consumption during pregnancy was found in a study looking at
health behaviors and support systems of pregnant women. Albrecht and Rankin (1989)
found that high trait anxiety was related with a lack of social support, which was related
with increased alcohol consumption in pregnant women.

In addition to the possibility of contributing to risk drinking, comorbid trait
anxiety may predict relapse in female alcoholics (Willinger, et al., 2002; Driessen, et al.,
recruited 521 detoxified alcohol-dependent patients (133 women) and found an overall
relapse rate of 85.5%, with trait anxiety and harm avoidance found to be significant
predictors for relapse in women. Specifically, lower harm avoidance and higher trait
anxiety indicated a higher likelihood of relapse. Likewise, Driessen and colleagues
(2001), found that trait anxiety lead to an increased risk of relapse in men and women
after 3 weeks of abstinence. In addition, trait anxiety levels were found to be consistently
and significantly higher among patients with lifetime comorbid anxiety disorders; no
significant change in mean trait anxiety scores were reported during a 6-week to 8-month
follow-up (Driessen, et al., 2001).
Panic Disorder, Trait Anxiety, and Alcohol among Pregnant Women

There is clinically significant comorbidity between anxiety disorders, including Panic Disorder, alcohol use disorders and possible risk drinking, especially among women. Health care professionals providing women’s reproductive health services should utilize medical appointments as a chance to engage women in treatment services if help is needed (Homish, Cornelius, Richardson, & Day, 2004; Chander, & McCaul, 2003). Since women are more likely to have regular visits with their physicians throughout their pregnancy relative to the postpartum period, pregnancy presents a special occasion to screen women for existing alcohol use and anxiety as well as risk factors for negative postpartum outcomes (Chander & McCaul, 2003). Pregnancy provides a powerful reason for stopping alcohol and drug use since an infant’s welfare may be of specific concern for a mother. Thus, pregnancy has been referred to as the “window of opportunity” for intervention and treatment (Daley, Argeriou, & McCarty, 1998).

Since alcohol use among women has been stigmatized in many societies throughout history, the felt discomfort and guilt may lead to underreporting alcohol use and severity in women and their families (Wilsnack & Wilsnack, 2002). Therefore, screening during pregnancy may identify at-risk women who may otherwise go untreated. In addition, comorbid alcohol and Panic Disorder can have negative consequences on maternal and fetal well-being. There is a greater chance that women with anxiety disorders will report alcohol consumption, and for alcohol-abusing women to report significant anxiety (Chander & McCaul, 2003). Anxiety disorders are common among
obstetrics and gynecology doctor's offices, and these disorders may influence alcohol risk and outcomes; thus, awareness of this co-occurrence is crucial in successful identification and treatment planning.
Statement of the Problem and Hypotheses

Previous research has shown that Panic Disorder and alcohol disorders are associated and co-occur at greater rates than chance (Grant, Stinson, et al., 2004; Kushner, Abrams, Borchardt, 2000; Kessler, et al., 1997; Grant, et al., 1994; Regier, et al., 1990). Women with Panic Disorder have a higher risk for comorbid Alcohol Abuse or Dependence (Piggott, 2003; Schuckit, et al., 1997; Kessler, et al., 1994). Recently, Panic Disorder was found to be a significant predictor of frequent drinking among patients attending an urban university-affiliated primary care outpatient clinic (Arch, Craske, Stein, Sherbourne, & Roy-Byrne, 2006). To date, none of this research has examined whether Panic Disorder is similarly related to alcohol use during pregnancy.

Higher trait anxiety has also been shown to relate to alcohol problems. Some studies have suggested that alcohol is used to cope with anxiety symptoms, such as trait anxiety (Kushner, Abrams, Thuras, & Hanson, 2000; Swendsen, et al., 2000). For example, Kushner and colleagues (2000) found that trait anxiety predicted a significant tendency to drink alcohol for anxiety management. Examining whether trait anxiety continues to share a similar relationship with alcohol use during pregnancy may have implications for assessment and treatment during pregnancy.

The importance of studying Panic Disorder and panic attacks, particularly as they relate to females, is evident from the higher prevalence rates across various studies. For example, epidemiological studies indicate a two to three-fold greater prevalence among females than males, and a higher persistence of symptomology among females (e.g., Reed & Wittchen, 1998).
Interestingly, some research suggests that pregnancy might be a protective period for women with Panic Disorder (Altemus, & Brogan, 2004; Klein, Skrobala, & Garfinkel, 1995; Cowley & Roy-Byrne, 1989; George, Ladenheim, & Nutt, 1987); whereas, trait anxiety levels are found to remain relatively stable and fall within the normal range for women (i.e., not significantly higher or lower) during pregnancy (Monk, Myers, Sloan, Ellman, & Fifer, 2003; Sjöström, Valentin, Thelin, & Maršál, 1997; Albrecht & Rankin, 1989). To date, only one study has examined the relationship of trait anxiety and alcohol use during pregnancy.

The importance of examining whether there is a relationship between current Panic Disorder, trait anxiety, and alcohol use among women is considerable when one takes into account the fact that women who consume similar amounts of alcohol as their male counterparts are more likely to endure alcohol-related problems (e.g., Chander & McCaul, 2003). Furthermore, the importance of considering current Panic Disorder and trait anxiety as possible risk factors for alcohol use (that either precede or result from its use) during pregnancy is considerable when one considers the various adverse affects of prenatal alcohol consumption on the mother and fetus, and the fact that no level of alcohol consumption during pregnancy has been deemed safe (e.g., Day & Richardson, 2004).

Upon presenting for OB/GYN care, many women are reluctant to disclose their alcohol use due to the social stigma attached to drinking, especially during pregnancy, which makes it difficult to identify and treat these women (Sokol, Martier, & Ager, 1989). Due to nondisclosure of alcohol use, there is a growing need for identification of
correlates associated with risk drinking. It may be especially important to identify whether these correlates differ among pregnant and non-pregnant women. OB/GYN clinics do not have the time or money for extensive psychological screening. Therefore, screening instruments that identify both risk drinking and anxiety may provide useful sources of information for identification, intervention, or treatment for women.

Specific aims of this study were to: 1) examine differences in rates of current Panic Disorder, panic attacks, and trait anxiety between pregnant and non-pregnant women receiving care at an urban OB/GYN clinic; 2) examine correlates and differences in alcohol use and at-risk drinking among these women; 3) assess whether meeting diagnostic criteria for Panic Disorder, having had a panic attack within the past month, and trait anxiety influence alcohol use and at-risk drinking among women, and whether pregnancy status moderates these associations.

_Panic and Anxiety in Pregnant and Non-pregnant Women._

Given that Panic Disorder is a severe and persistent anxiety disorder, and women are more commonly diagnosed than men (e.g., Katschnig & Amering, 1998), it is important to determine whether prevalence rates of Panic Disorder varies in pregnant women. A diagnosis of Panic Disorder is expected in only a small proportion of the total sample. In order to increase power, the present study will include recent panic attacks (one of the criteria of Panic Disorder), in addition to Panic Disorder diagnoses, as a variable of interest.

As discussed earlier, previous research indicates that pregnancy may be a protective period against Panic Disorder (e.g., Cowley & Roy-Byrne, 1989). However,
while the prevalence of Panic Disorder may be lower during pregnancy, research suggests that trait anxiety should remain relatively stable and within the normal range (i.e., not higher or lower compared to the non-pregnant sample) during pregnancy (e.g., Coplan, et al., 2005). Thus, one purpose of the present study is to examine differences in rates of current Panic Disorder, panic attacks, and trait anxiety between pregnant and non-pregnant women.

**Hypothesis 1:** Pregnant women are less likely to have a Panic Disorder diagnosis and/or a panic attack within the past month compared to non-pregnant women.

**Hypothesis 2:** There are no differences in trait anxiety levels between pregnant and non-pregnant women.

**Relation of Panic disorder and Trait Anxiety.**

Research with non-pregnant women has shown that women with Panic Disorder have higher levels of trait anxiety (e.g., Shear & Maser, 1994). However, studies have not used a pregnant comparison sample to determine whether the relation between trait anxiety and Panic Disorder is the same as that among non-pregnant women. Thus, another purpose of the present study is to examine the relationship between Panic Disorder and trait anxiety among pregnant and non-pregnant women. As with Hypothesis 1, Panic Disorder may not occur in enough women for power to be effective; thus, a panic attack within the past month has been added in order to increase power.

**Hypothesis 3:** Non-pregnant and pregnant women with Panic Disorder and/or a panic attack within the past month will have higher trait anxiety compared to women without Panic Disorder and/or a panic attack within the past month.
Risk Drinking among Pregnant and Non-Pregnant Women.

Research suggests that alcohol use declines after pregnancy recognition in most women, but unfortunately, many women still use alcohol after pregnancy recognition. Thus, another purpose of the present study is to determine the prevalence of risk drinking among pregnant and non-pregnant women. It is predicted that pregnant women will report a significantly lower quantity/frequency of past 30 day alcohol use than non-pregnant women. However, pregnancy status will not influence the likelihood of being identified as at-risk for problematic alcohol use during pregnancy.

Panic Disorder, Trait Anxiety and Risk Drinking among Pregnant and Non-Pregnant Women.

As stated previously, epidemiological surveys and clinical studies have shown that alcohol disorders and Panic Disorder are strongly associated and widespread throughout the general population (e.g., Grant, Stinson, et al., 2004). However, research has not compared the relationship between Panic Disorder and risk drinking in pregnant women. Given that pregnant women are reportedly less likely to have Panic Disorder, it is less likely that they will be risk drinkers, which is an important variable to look for when determining whether the protective period against Panic Disorder (a disorder that may lead to or result from alcohol use), lends to lower risk drinking in pregnant women. Research suggests that trait anxiety predicts a significant tendency to drink alcohol for anxiety management. Moreover, a relation between trait anxiety and alcohol consumption during pregnancy has been reported in one article (Albrecht & Rankin, 1989), but more research with pregnant women is needed.
Hypothesis 4: Panic Disorder, panic attacks, and trait anxiety contribute significantly, above and beyond demographics, to the prediction of risk drinking, and pregnancy status will moderate these associations.
Methods

Participants

The sample consists of 412 pregnant women and 139 non-pregnant women receiving care at VCU Health Systems’ OB/GYN clinics. Potential participants were recruited in-person by members of the Promoting Healthy Pregnancies (PHP) Research Team and by IRB-approved flyers distributed in the OB/GYN clinics.

Inclusion criteria: Women who were 18 years of age or older, English speaking, seeking OB/GYN care at VCU Medical Center, and able to read and understand the consent form, were included in this study.

Exclusion criteria: Women who were incarcerated, under 18 years of age, non-English speakers, or who had serious psychiatric or cognitive impairments that prevented them from giving true informed consent, were excluded from the study.

This study was approved by Virginia Commonwealth University’s Institutional Review Board under “Project ASK: Getting the Facts on Health and Well-Being During Pregnancy,” protocol number 3010.

Design and Procedures

The study used a cross-sectional design that included two samples of women: pregnant women attending the OB/GYN clinic for their first obstetrics (OB) appointment; and non-pregnant women attending a gynecological (GYN) appointment at the OB/GYN clinic for the first time. Together, the two samples formed a larger study called Project ASK.
**Pregnant Sample.** Recruitment for the pregnant sample occurred in the OB/GYN clinic from April 2, 2003 through May 25, 2004. The clinic’s appointment records were used to identify eligible participants. When eligible patients arrived at the receptionist’s desk they were given a handout with recruitment materials. These included a flyer with information about the study, a women’s referral list, and a consent form. The reception desk staff subsequently paged PHP research staff to inform them that the eligible patient had arrived. A research staff member from the PHP team then approached the patient in the waiting room and briefly explained the purpose of the study. If the patient was interested in participating, informed consent was obtained and the patient was provided with a copy of the consent document, while the original consent form was retained by the research team and filed in a locked drawer.

After the initial screening and informed consent was completed, participants received a questionnaire packet that consisted of fifteen different measurement instruments. The questionnaire packet included some instruments that asked about such things as emotional and psychological functioning (e.g., Panic Disorder, level of anxiety), health-related behaviors (e.g., alcohol use, risk drinking), and demographic information.

The questionnaires took 30 to 45 minutes to complete, and participants had the option of returning the packet of questionnaires while at the clinic, returning the packet via mail, or hand delivering the finished packet during a subsequent visit to the clinic. Participants were compensated $30 for completing the packet.

During the OB recruitment phase, 70.6% (1,602) of the 2,269 intake appointments scheduled in the clinic followed through with their appointments. No shows accounted
for 27% (610) and cancellations accounted for another 2.5% (57) of all scheduled appointments. Ineligibility due to being under 18 years old, non-English speakers, incarcerated, or other exclusions, comprised 12.5% (283) of those who showed up for their scheduled appointments. In addition, 43.4% ($N = 572$) were not consented due to problems with the clinic staff (for example, not giving the patient study information upon check-in), lack of time to complete the consent process, or problems with PHP research staff (for example, an inability to approach the eligible patient due to being with another study participant).

Of the 747 eligible OB patients who showed for their appointments: 72.8% ($N = 544$) consented to participate in the study, 27.2% ($N = 203$) refused to participate. Of the 544 patients who consented to participate, 75.7% ($N = 412$) returned the completed packet of questionnaires.

*Non-pregnant Sample.* Recruitment for the non-pregnant sample took place at the OB/GYN clinic from September 14, 2004 through May 04, 2005. Recruitment procedures for non-pregnant women largely matched the recruitment procedures for pregnant women described above. However, a few differences in GYN recruitment should be noted: First, PHP research staff recruited women directly instead of relying on referral by clinical staff. Second, patients were required to complete the packet of questionnaires on site, and were not given the option to mail the packet back.

During the GYN recruitment phase, 50.7% (414) of the 816 intake appointments scheduled in the clinic showed for their appointments. No shows accounted for 45.3% (370) and cancellations accounted for another 3.9% (32) of all scheduled appointments.
Ineligibility due to being under 18 years old, non-English speakers, incarcerated, or other exclusions, comprised 1.0% (8) of those who showed up for their scheduled appointments. An additional 41.6% (N = 169) were not consented due to lack of time to complete the consent process, problems with PHP research staff (for example, an inability to approach the eligible patient due to being with another study participant).

Of the 237 eligible GYN patients who showed for their appointments: 66.2% (N = 157) consented to participate in the study and 33.8% (N = 80) refused to participate. Of the 157 patients who consented to participate, 88.5% (N = 139) completed and returned the packet of questionnaires.

**Measures**

Participants were provided with a questionnaire packet that included fifteen separate measurement instruments: Patient Health Questionnaire (PHQ; Spitzer, Kroenke, & Williams, 1999), the Africentric Worldview Scale (AWS; Belgrave & Logan, 2002), the Individualism-Collectivism Scale (ICS; Triandis et al., 1986), the Maternal-Fetal Attachment Scale (MFAS; Cranley, 1981), the Short Form Perceived Social Support (SFPSS; Rice & Longabaugh, 1996), the Prenatal Social and Environmental Inventory (PSEI; Orr, James, & Casper, 1992), the Brief COPE (Carver, Scheier, & Weintraub, 1989), the Alcohol Use Questionnaire (AUQ; PHP research team), Reasons for Drinking (RFD; Cronin, 1997), the Perceived Benefits of Drinking Scale (PBDS; Singer & Petchers, 1987), the Caffeine Questionnaire (PHP research team), the Beck Depression Inventory-Second Edition (BDI-II; Beck, Steer, & Brown, 1996), the Center for Epidemiological Studies-Depression (CES-D; Radloff, 1977), the State-Trait Anxiety
Inventory (STAI; Spielberger, 1983), and Experience with VCU Health System (PHP team). The GYN sample completed a very similar questionnaire battery, with minor revisions to forms dealing with pregnancy related questions.

The following measures were used for the present study: PRIME-MD Patient Health Questionnaire (PHQ), State Trait Anxiety Inventory (STAI), Alcohol Use Questionnaire (AUQ), Pregnancy Assessment of Lifestyle (PAL), and Lifestyle Assessment in Women (LAW).

**PRIME-MD Patient Health Questionnaire (PHQ).** The PRIME-MD Patient Health Questionnaire (referred to as PHQ) (see Appendix) is a self-administered version of the Primary Care Evaluation of Mental Disorders (PRIME-MD), which is a screening instrument for psychiatric disorders using DSM-IV diagnostic criteria. While the self-administered PHQ has diagnostic comparability to that of the original PRIME-MD, it is more efficient, requiring less time for completion. Diagnostic algorithms are used, requiring less than 3 minutes for scoring and review (Spitzer, Kroenke, & Williams, 1999).

Eight of the most common disorders in primary care settings are divided into threshold disorders (i.e., Panic Disorder, other anxiety disorders, Bulimia Nervosa, and Major Depressive Disorder) and subthreshold disorders, where less symptoms are needed for particular DSM-IV diagnoses (i.e., probable Alcohol Abuse or Dependence, Somatoform, other Depressive Disorder, and Binge Eating Disorders) in the PHQ. In addition, disorders unique to women are assessed through questions about menstruation, pregnancy, childbirth, and recent psychosocial stressors (Spitzer, et al., 1999).
Developers of the PHQ surveyed 3,000 individuals and found good consistency between PHQ diagnosis and those of the independent mental health professionals (sensitivity, 75%; specificity, 90%; overall accuracy, 85%). Thus, the PHQ does not tend to overdiagnose or underdiagnose any mental disorder, since prevalence rates for diagnosis were nearly identical (Spitzer, et al., 1999).

The PHQ has also been validated for use in obstetric-gynecologic (OBGYN) patients, and found useful in assessing psychiatric disorders, functional impairment, and recent psychosocial stressors in this population (Spitzer, Williams, Kroenke, Hornyak, & McMurray, 2000). Patients with PHQ diagnoses suffered greater functional impairment, health care use, disability days, and recent psychosocial stressors, than those without PHQ diagnoses. Prevalence rates were found to be lower among OBGYN patients compared with the primary care sample (20% and 27%, respectively).

Panic Disorder Diagnosis. The PHQ is a valid and practical tool with which to identify Panic Disorder (Löwe, et al., 2003). In the original validation of the PHQ the Panic Disorder diagnostic section had high specificity (99%), sensitivity (81%), and overall accuracy (98%), as reported by developers (Spitzer, et al., 1999).

The PHQ has also been validated for use in obstetric-gynecologic (OBGYN) patients, and found useful in assessing psychiatric disorders, functional impairment, and recent psychosocial stressors in this population (Spitzer, Williams, Kroenke, Hornyak, & McMurray, 2000). Prevalence rates for panic disorder were found to be lower among OBGYN patients compared with the primary care sample (3% and 6%, respectively).
State Trait Anxiety Inventory (STAI). The State Trait Anxiety Inventory (STAI) is an instrument comprised of two 20-item self-report scales for assessing levels of state and trait anxiety. It takes about 10 minutes to complete both the state and trait anxiety scale. People are instructed to rate how they feel “right now, at this moment” for the 20-item state anxiety scale and how they “generally feel” for the 20-item trait anxiety scale (Spielberger, 1983). Each of the twenty items in the trait anxiety scale is rated on a four point Likert scale, ranging from 1 “almost never” to 4 “almost always” (Demos & Prout, 1994).

The trait anxiety scale includes 11 negatively worded items (anxiety-present) and the remaining nine items are positively worded (anxiety-absent). The nine anxiety-absent items from the trait anxiety scale must be reverse coded before summing the trait anxiety items. Total scores for the twenty items of the trait anxiety scale, counting the reversed scores, are summed for the trait anxiety score, which can range from 20 to 80 (Spielberger, 1983).

The manual reports mean STAI trait anxiety scores for working adults, college students, high school students, and military recruits. Normative data for females on the trait anxiety showed that: female working adults had a mean 34.79 (SD = 9.22), alpha = .91; female college students had a mean of 40.40 (SD = 10.15), alpha = .91; female high school students had a mean of 40.97 (10.63), alpha = .90; and female military recruits had a mean score of 40.03 (SD = 9.90), and an alpha = .90 (Spielberger, 1983).

Developers of the STAI found high test-retest correlations for groups of college students, with ranges between .73 and .86. Measures of internal consistency for Form Y
by alpha coefficients via Formula KR-20 for trait anxiety are high, with a median coefficient of .90. Item-remainder correlations for the trait anxiety scale are .30 and higher in the normative samples across both genders (Spielberger, 1983).

Nineteen years after the publication of STAI Form Y, Barnes, Harp, and Jung (2002) performed a reliability generalization study on the STAI, which reviewed 816 research articles that used this measure between 1990 and 2000. Of the studies that reporting reliability, Barnes and colleagues (2002) found test-retest reliability coefficients had a mean reliability coefficient of .88, and a range of .82 to .94. Internal consistencies for trait anxiety coefficients had a mean of .89, with a range of .72 to .96.

*Alcohol Use Questionnaire (AUQ).* The AUQ (see Appendix) is a 12-item measure designed by the PHP research team to measure alcohol use separately on weekdays and weekends.

*Pregnancy Assessment of Lifestyle (PAL).* The PAL (see Appendix) is a questionnaire for pregnant women developed by Promoting Healthy Pregnancies to assess demographic information (e.g., age, marital status, education, race, employment status) and screen for a variety of health behaviors, (e.g., tobacco, alcohol, and drug use). A standardized alcohol use screening measure (i.e., TWEAK) is embedded within the PAL to identify potentially problematic alcohol use.

*Lifestyle Assessment in Women (LAW).* The LAW is a questionnaire developed for non-pregnant women by Promoting Healthy Pregnancies. The LAW includes items identical to the PAL, with the exception of questions about pregnancy.
TWEAK. Brief screening measures using an indirect approach when assessing for problem drinking is preferred because direct questions can prompt denial and underestimates of intake, particularly among heavy drinkers (Russell, et al., 1996). Accordingly, the TWEAK (Russell, 1994) is a brief 5-item standardized screening measure used to detect problem drinking, by focusing on specific problems areas. It was developed for pregnant women and has been validated using pregnant women attending an inner city clinic. The TWEAK is a mnemonic that stands for Tolerance (hold), Worry, Eye opener, Amnesia, C(K)ut down. The five TWEAK questions are: 1) Tolerance: How many drinks does it take before the alcohol makes you fall asleep or pass out? 2) Have close friends or relatives Worried or complained about your drinking in the past year? 3) Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (Eye opener)? 4) Has a friend or family member ever told you about things you said or did while you were drinking that you could not remember (Amnesia/Blackouts)? 5) Have you ever C(K)ut down on your drinking?

Points are given for affirmative responses to each of the TWEAK items, with total scores ranging from zero to seven. A response of six or more drinks for the “tolerance” (hold) item indicates an affirmative response. An affirmative answer for the “tolerance” item and/or the “worried” item is scored two points, while an affirmative response to the EAK items are each scored one point. Individuals with two or more points on the TWEAK (TWEAK ≥ 2) are considered to be at risk for problem drinking (Russell, 1994). Studies screening for alcohol abuse among pregnant women showed that 70% of women with two or more implications of problem drinking were identified with three questions.
These questions addressed blackouts, the need to cut down on drinking, and having relatives or friends worry or complain about the patient’s drinking in the past year (Russell, 1994).

The TWEAK is recognized as a valuable tool for screening for at-risk alcohol use in pregnant and non-pregnant women. In a study of low-income African American pregnant women, the TWEAK showed good specificity (85%) and sensitivity (79%) at a cutoff of ≥2 (Russell, et al., 1994). Flynn and colleagues (2003) found that White women were 3.7 times more likely to score above the TWEAK cutoff score of 2 compared to African-American women, suggesting that White women are more likely than African-American women to be risk-drinkers during pregnancy.

Variables

Continuous variables included age at first visit and years of education.

Categorical data were grouped and dummy coded as follows: race (0 = Caucasian, 1 = African-American), marital status (0 = married, 1 = all others [e.g., never married/divorced/separated/widowed]), employment status (0 = working/in school, 1 = unemployed/disabled/not working outside the home), whether the pregnancy was planned (0 = planned, 1 = unplanned). Trimester at first prenatal visit was based on nominal scale (first trimester = 1, second trimester = 2, third trimester = 3).

Panic Disorder Diagnosis. Panic Disorder status was categorized into a dichotomous variable, as those who have a Panic Disorder diagnosis (i.e., those who meet DSM-IV diagnostic criteria for Panic Disorder via PHQ) versus those with no Panic Disorder diagnosis (1 = Panic Disorder diagnosis, 0 = no Panic Disorder diagnosis).
Panic Attack in Past Month. Having a panic attack in the past month was categorized into a dichotomous variable, as those who report having had a panic attack in the past month versus those with no panic attacks in the past month (1 = panic attack, 0 = no panic attack).

Alcohol Risk Drinking. Alcohol risk drinking was assessed through both a continuous and a categorical variable. Risk drinking as a continuous variable was assessed through quantity/frequency of alcohol use items (over past 30 days) via AUQ. The TWEAK screening measure was used for identifying women would be at-risk for problematic drinking during pregnancy. This measure can assess potential for perinatal risk drinking regardless of whether the person is currently pregnant. TWEAK scores of 2 or higher were dichotomized (1 = at-risk vs 0 = not at-risk) to indicate those who would be at-risk for problematic drinking during pregnancy. A score of $\geq 2$ is a recommended cutoff score for pregnant women who might not be alcohol dependent but who may, however, put the fetus at risk (Russell, et al., 1996).

Data Analysis Plan

Demographics and Initial Analyses. Statistical analyses were performed using SPSS v. 12.0 (SPSS, Chicago, IL). Comparisons of participant characteristics between pregnant and non-pregnant women were performed by means of t-tests and chi-square analysis. T-tests and chi-square analyses were also conducted to examine differences in quantity/frequency of past 30 day alcohol use and between at-risk drinking based on participant characteristics.
Hypotheses. A chi-square analysis was used to examine hypothesis one. Independent samples t-tests were conducted to examine hypotheses two and three. The characteristics identified as statistically significant with quantity/frequency of past 30 day alcohol use ($p < .005$) at initial analysis were subsequently included in hierarchical multiple regression/correlation (MRC) analyses with interactions when quantity/frequency of past 30 day alcohol use was used as the criterion variable for hypothesis four. The characteristics identified as statistically significant with the TWEAK cutoff ($p < .005$) at initial analysis were subsequently included in logistic regressions when TWEAK cutoffs were used as the criterion variable for hypothesis four.
Results

*Demographics*

Descriptive statistics were calculated to examine participant characteristics. The average age of all participants was 27.6 years, SD = 7.6. The average years of education completed by participants was 12.6 years, SD = 2.4. Most participants (77.3%) were single and either had never married, divorced, separated, widowed. As shown in Table 1, an independent samples t-test showed that non-pregnant women were older than pregnant women, $t(551) = 8.6, p < .005$. An independent samples t-test also showed non-pregnant women had a greater level of education than pregnant women, $t(551) = 2.7, p < .01$.

Table 1

*Participant Characteristics: Pregnant (n = 412) and Non-Pregnant (n = 139)*

<table>
<thead>
<tr>
<th></th>
<th>Pregnant</th>
<th>Non-Pregnant</th>
<th>Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% or $M$ (SD)</td>
<td>% or $M$ (SD)</td>
<td>% or $M$ (SD)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>25.7 (5.7)</td>
<td>33.1 (9.6)</td>
<td>27.6 (7.6)</td>
</tr>
<tr>
<td>Education (last grade completed)</td>
<td>12.5 (2.3)</td>
<td>13.1 (2.5)</td>
<td>12.6 (2.4)</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>23.8%</td>
<td>19.4%</td>
<td>22.7%</td>
</tr>
<tr>
<td>Single/divorced/separated/widowed</td>
<td>76.2%</td>
<td>80.6%</td>
<td>77.3%</td>
</tr>
</tbody>
</table>
Race Analysis.

Thirty-two (5.8%) of the 551 women identified their race as something other than African-American or Caucasian. Of these 32 women, six indicated "Asian-American," nine indicated "Hispanic," and 17 answered "Other" when identifying their race (See Table 2). There were no significant differences in race between pregnant and non-pregnant women. In order to facilitate analysis and due to the low percentage of non-African-American or Caucasian respondents in the sample, these 32 cases were dropped, leaving 519 research participants.

Table 2

Race of Participants: Pregnant (n = 412) and Non-Pregnant (n = 139)

<table>
<thead>
<tr>
<th>Race</th>
<th>Pregnant %</th>
<th>Non-Pregnant %</th>
<th>Total Sample %</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Caucasian</td>
<td>30.1%</td>
<td>30.7%</td>
<td>30.2%</td>
</tr>
<tr>
<td>% African-American</td>
<td>64.8%</td>
<td>61.3%</td>
<td>63.9%</td>
</tr>
<tr>
<td>% Asian-American</td>
<td>0.7%</td>
<td>2.2%</td>
<td>1.1%</td>
</tr>
<tr>
<td>% Hispanic</td>
<td>1.7%</td>
<td>1.5%</td>
<td>1.6%</td>
</tr>
<tr>
<td>% Other</td>
<td>2.7%</td>
<td>4.4%</td>
<td>3.1%</td>
</tr>
</tbody>
</table>

Data Analysis

Outliers and Tests of Normality. Frequency distributions and univariate statistics were examined for evidence of non-normality and outliers. Using centered leverages, externally studentized residuals, DFFITS, DFBETAS, and by visually inspecting the data
plotted on histograms, outliers were detected in quantity/frequency of past 30 day alcohol use. However, the outliers were expected within the sample because approximately 5.0% of women in the general population have alcohol abuse or dependency problems (e.g., Grant, Dawson, et al., 2004). Therefore, outliers found for quantity/frequency of past 30 day alcohol use were expected and left unchanged. Kolmogorov-Smirnov and Shapiro-Wilk statistics were used to test for normality of the data. Skewness and kurtosis were also examined by dividing kurtosis and skewness by their standard errors. These tests showed that data in this study were normally distributed.

*Effects of Missing Data.*

A check was performed to determine if missing data were missing at random. This was done by creating dummy variables to represent missing data for each independent variable and correlations were examined for each dependent variable.

*Mean Substitution.* Mean substitution was used for continuous variables with missing data. There were no missing cases for the dependent variable quantity/frequency of past 30 day alcohol use. The independent variable age contained no missing data. The independent variable education contained 21 cases that were missing, and neither was significantly correlated with any of the dependent variables; thus, mean substitution was used for these 21 cases.

Nine cases were missing for trait anxiety in the non-pregnant group (i.e., at least one item blank on the 20-item STAI trait anxiety scale). None of these missing cases were significantly correlated with any of the dependent variables; therefore, group mean substitution at the subscale level was used for the non-pregnant sample. The pregnant
sample had 33 missing cases for trait anxiety that were also found to be missing completely at random and so group mean substitution at the subscale level from the pregnant sample was used for these cases.

*Cases Excluded from Analyses.* Cases were dropped for categorical variables with missing data. The independent variable marital status contained no missing data. There were two cases with missing data for the independent variable race. These cases were dropped when race was used in analyses. There were 11 cases missing for employment status; none of these missing cases were significantly related with any of the dependent variables. These 11 cases were dropped when employment status was used in analyses. There were 12 missing cases for Panic Disorder as a result of blank responses for one or more of the diagnostic items on the PHQ. These 12 missing cases were dropped in analyses that included Panic Disorder as a variable of interest. There were six missing cases (i.e., six blank answers) for the question: “In the last 4 weeks, have you had an anxiety attack – suddenly feeling fear or panic?” These six missing cases were dropped when having had a panic attack within the past month was a variable of interest.

*Dependent and Criterion Variables.* Univariate analyses included the total sample (\(n = 519\)) unless the specific variable being tested had a missing case that was dropped. Multivariate analyses included only cases that had information for all variables entered into the regression. There were no missing cases for quantity/frequency of past 30 day alcohol use. There were two missing responses for the TWEAK cutoff score that were dropped when TWEAK was a variable of interest.
Of the 519 participants in the sample, 496 (95.6%) were analyzed when quantity/frequency of past 30 day alcohol use was used as the criterion variable for hypothesis 4. Twenty-three (4.6%) cases were missing at least one variable included in the hierarchical multiple regression/correlations (MRC); therefore, these data were not used in the analyses. Of the 519 participants in the sample, 509 (98.1%) were analyzed in the logistic regression when TWEAK cutoffs were used as the criterion variable for hypothesis 4. Ten (1.9%) cases were missing at least one variable that was included in the logistic regression; therefore, these data were not used in the analyses. Of the 391 participants in the pregnant sample, 373 (95.6%) were analyzed in the hierarchical MRC used for hypothesis 4, when including pregnant women only in the analysis. Eighteen (4.6%) cases were missing at least one variable included in the regression.

Initial Analyses

Univariate statistics were calculated to examine differences for the following variables of interest: quantity/frequency of past 30 day alcohol use, and cases scoring above and below the TWEAK cutoff score of two.

The present study includes a large number of independent samples t-tests and chi-squares. In order to control for the inflation of Type I error rate, a Bonferroni correction was applied: \( \alpha \) was set to \( 0.05/09 \) for t-tests and chi-squares (Muris, et al, 2000). Thus, according to Bonferroni corrections, significance level was set at .005.

Quantity/Frequency Alcohol Use. As stated previously, risk drinking was measured and analyzed in two separate ways: the first was through quantity/frequency of past 30 day alcohol use. The number of drinks consumed in the past 30 days ranged from
0 to 288 drinks. As shown in Table 3, pregnant women reported a lower quantity/frequency of past 30 day alcohol use than non-pregnant women, $t\ (517) = -2.4, p < .0005$. An independent samples t-test was also used to examine the effect of race on past 30 day alcohol use. There were no significant differences in past 30 day alcohol use by race, $t\ (515) = -0.3$. An independent samples t-test showed that quantity/frequency of past 30 day alcohol use did not differ significantly between participants who were married versus participants who were single/divorced/separated/widowed, $t\ (517) = -1.0$. Participants who were employed (working/in school) reported a lower quantity/frequency of past 30 day alcohol use than participants who were unemployed (unemployed/disabled/not working outside the home). An independent samples t-test showed this difference to be significant, $t\ (506) = -1.7, p < .001$, suggesting there is a negative relationship between employment status and alcohol use. As would be expected, women who were identified as being at-risk for problematic drinking during pregnancy (i.e., TWEAK score of $\geq 2$) reported greater quantity/frequency of past 30 day alcohol use than those identified as not at risk drinkers. An independent samples t-test showed this difference to be significant, $t\ (515) = 3.1, p < .0005$, suggesting there is a positive relationship between a TWEAK cutoff score $\geq 2$ and alcohol use.

Participants who met diagnostic criteria for Panic Disorder reported a higher quantity/frequency of past 30 day alcohol use than participants who did not meet diagnostic criteria for Panic Disorder. An independent samples t-test showed this difference to be significant, $t\ (505) = 1.2, p < .0005$, suggesting there is a relationship between Panic Disorder and alcohol use. Likewise, participants who had a panic attack
within the past month reported a higher quantity/frequency of past 30 day alcohol use than participants without a panic attack within the past month. An independent samples t-test showed this difference to be significant, $t(511) = 1.4, p < .0005$, suggesting there is a relationship between panic attacks and alcohol use.

For those attending their first OB appointment, a one-way analysis of variance revealed that quantity/frequency of past 30 day did not vary based on trimester (i.e., first trimester, second trimester, third trimester), $F(2, 381) = 1.14$. Pregnant women who reported their pregnancy was planned had a lower quantity/frequency of past 30 day alcohol use than pregnant women who reported their pregnancy was unplanned. An independent samples t-test showed this difference to be significant, $t(382) = -2.7, p < .005$, suggesting there is a negative relationship between whether the current pregnancy was planned and alcohol use within the past month.

Table 3

<table>
<thead>
<tr>
<th>Summary of Differences in Quantity/Frequency of Past 30 Day Alcohol Use (average number of drinks) based on Participant Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>$M (SD)$</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>Pregnancy Status ($n = 519$)</td>
</tr>
<tr>
<td>Pregnant ($n = 391$)</td>
</tr>
<tr>
<td>Non-Pregnant ($n = 128$)</td>
</tr>
<tr>
<td>Race ($n = 517$)</td>
</tr>
<tr>
<td>Caucasian ($n = 166$)</td>
</tr>
<tr>
<td>African-American ($n = 351$)</td>
</tr>
<tr>
<td>Status</td>
</tr>
<tr>
<td>--------------------------------------------</td>
</tr>
<tr>
<td><strong>Marital Status</strong> (n = 519)</td>
</tr>
<tr>
<td>Married (n = 111)</td>
</tr>
<tr>
<td>Never married/separated/divorced/widowed</td>
</tr>
<tr>
<td><strong>Employment Status</strong> (n = 508)</td>
</tr>
<tr>
<td>Working/In School (n = 269)</td>
</tr>
<tr>
<td>Unemployed/Disabled/Not working outside the</td>
</tr>
<tr>
<td>home (n = 239)</td>
</tr>
<tr>
<td><strong>TWEAK cutoff</strong> (n = 517)</td>
</tr>
<tr>
<td>At-Risk (≥ 2) (n = 160)</td>
</tr>
<tr>
<td>Not At-Risk (≤ 2) (n = 357)</td>
</tr>
<tr>
<td><strong>Panic Disorder Status</strong> (n = 507)</td>
</tr>
<tr>
<td>Panic Disorder (n = 25)</td>
</tr>
<tr>
<td>No Panic Disorder (n = 482)</td>
</tr>
<tr>
<td><strong>Panic Attack Status</strong> (n = 513)</td>
</tr>
<tr>
<td>Panic Attack (within past month) (n = 87)</td>
</tr>
<tr>
<td>No Panic Attack (within past month) (n = 426)</td>
</tr>
<tr>
<td><strong>Planning Status</strong>* (n = 405)</td>
</tr>
<tr>
<td>Planned Pregnancy (n = 86)</td>
</tr>
<tr>
<td>Unplanned Pregnancy (n = 298)</td>
</tr>
<tr>
<td><strong>Trimester</strong>* (n = 384)</td>
</tr>
<tr>
<td>First Trimester (n = 197)</td>
</tr>
<tr>
<td>Second Trimester (n = 136)</td>
</tr>
</tbody>
</table>
As shown in Table 4, an examination of age and quantity/frequency of past 30 day alcohol use revealed a positive correlation between age and alcohol use. This was supported by the Pearson’s correlation coefficient, \( r(519) = .13, p < .005 \). An examination of the quantity/frequency of past 30 day alcohol use and the participant’s level of education (i.e., last grade completed) revealed a non-significant negative correlation, \( r(519) = -.02 \). An examination of the quantity/frequency of past 30 day alcohol use and the participant’s level of trait anxiety revealed a positive correlation between alcohol use and higher trait anxiety. A Pearson’s correlation coefficient supported this observation, \( r(519) = .18, p < .0005 \).

Table 4

*Summary of Differences in Quantity/Frequency of Past 30 Day Alcohol Use based on Participant Characteristics (Pearson’s r) n = 519*

<table>
<thead>
<tr>
<th>Variable</th>
<th>( r )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.13</td>
<td>(&lt; .005)</td>
</tr>
<tr>
<td>Education (last grade completed)</td>
<td>-0.02</td>
<td>* ns</td>
</tr>
<tr>
<td>Trait Anxiety Level</td>
<td>0.18</td>
<td>(&lt; .0005)</td>
</tr>
</tbody>
</table>
**TWEAK Cutoff.** A TWEAK cutoff score of ≥ 2 identified 30.9% of participants as at-risk for problematic drinking. As shown in Table 5, 31.1% of pregnant women and 30.5% of non-pregnant women were identified as being at-risk for problematic drinking. A 2 x 2 chi-square analysis revealed this was a non-significant difference, $\chi^2(2, N = 517) = 0.02$, suggesting there is no relationship between current pregnancy status and being identified as at-risk for problematic drinking. While almost half of Caucasian participants (48.2%) were identified as being at-risk for problematic drinking (i.e., TWEAK cutoff ≥ 2), less than one fourth of African-American participants (22.9%) were identified as being at-risk for problematic drinking. A 2 x 2 chi-square analysis revealed this was a significant difference, $\chi^2(2, N = 515) = 33.5, p < .0005$, suggesting there is a relationship between race/ethnicity and being at-risk for problematic drinking.

An independent samples t-test revealed there were no significant differences in age for those scoring above the TWEAK cutoff scores compared to those scoring below the TWEAK cutoff scores, $t(515) = -0.4$. An independent samples t-test also revealed no significant differences in education for those meeting TWEAK cutoff scores and those not meeting TWEAK cutoff scores, $t(547) = 0.3$.

While 32.4% of participants who were married scored above the TWEAK cutoff score, 30.5% of participants who were single/divorced/separated/widowed also met this criterion. A 2 x 2 chi-square analysis revealed that this was a non-significant difference, $\chi^2(2, N = 517) = 0.1$, suggesting there is no relationship between marital status and TWEAK cutoff scores. While 29.9% of participants who were employed (i.e., working/in school) scored above the TWEAK cutoff score, 32.4% of participants who
were unemployed (i.e., unemployed/disabled/not working outside the home) also scored above the TWEAK cutoff. A 2 x 2 chi-square analysis revealed that this was a non-significant difference, $\chi^2(2, N = 506) = 0.4$, suggesting there is no relationship between employment status and TWEAK cutoff scores.

Over half of the participants who met criteria for Panic Disorder were at-risk for problematic drinking (52.0%), while less than one third of participants without Panic Disorder were at-risk for problematic alcohol use (29.6%). A 2 x 2 chi-square analysis indicated this difference was significant, $\chi^2(2, N = 505) = 5.6, p < .02$. Almost half of the participants who reported having had a panic attack within the past month (46.0%) were at-risk for problematic drinking, whereas, less than one-third of those who reported no panic attacks within the past month were at-risk for problematic drinking (27.8%). A 2 x 2 chi-square analysis indicated this difference was significant, $\chi^2(2, N = 511) = 11.1, p < .001$. An independent samples t-test also showed that participants identified by the TWEAK cutoff as being at-risk for problematic drinking had higher trait anxiety than participants identified as not at-risk drinkers, $t(515) = 1.9, p < .05$, suggesting a relationship between trait anxiety and being at-risk for problematic drinking.

For pregnant women, a chi-square analysis showed that trimester (i.e., first trimester, second trimester, third trimester) did not significantly influence whether women were identified as being at-risk for problematic drinking as indicated by TWEAK cutoff, $\chi^2(2, N = 382) = 2.8$. Whether the pregnancy was planned or unplanned also did not significantly influence whether participants met TWEAK cutoff scores, $\chi^2(2, N = 382) = 0.1$. 
Table 5

*Differences in Participants who Scored Above and Below TWEAK Cutoff*

<table>
<thead>
<tr>
<th></th>
<th>TWEAK + M (SD) or %</th>
<th>TWEAK - M (SD) or %</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pregnancy Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnant (n = 389)</td>
<td>31.1%</td>
<td>68.9%</td>
<td></td>
</tr>
<tr>
<td>Non-Pregnant (n = 128)</td>
<td>30.5%</td>
<td>69.5%</td>
<td><em>ns</em></td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian (n = 166)</td>
<td>48.2%</td>
<td>51.8%</td>
<td></td>
</tr>
<tr>
<td>African-American (n = 349)</td>
<td>22.9%</td>
<td>77.1%</td>
<td>&lt; .0005</td>
</tr>
<tr>
<td><strong>Age (years)</strong> (n = 517)</td>
<td>27.3 (7.2)</td>
<td>27.6 (7.9)</td>
<td><em>ns</em></td>
</tr>
<tr>
<td><strong>Education</strong> (last grade completed) (n = 517)</td>
<td>12.6 (2.3)</td>
<td>12.5 (2.3)</td>
<td><em>ns</em></td>
</tr>
<tr>
<td><strong>Marital Status</strong> (n = 517)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married (n = 111)</td>
<td>32.4%</td>
<td>67.6%</td>
<td></td>
</tr>
<tr>
<td>Never married/separated/widow (n =406)</td>
<td>30.5%</td>
<td>69.5%</td>
<td><em>ns</em></td>
</tr>
<tr>
<td><strong>Employment Status</strong> (n = 506)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working/In School (n = 268)</td>
<td>29.9%</td>
<td>70.1%</td>
<td></td>
</tr>
<tr>
<td>Unemployed/Disabled/Not working</td>
<td>32.4%</td>
<td>67.6%</td>
<td><em>ns</em></td>
</tr>
<tr>
<td>outside the home (n = 238)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Panic Disorder Status</strong> (n = 505)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panic Disorder Diagnosis (n = 25)</td>
<td>52.0%</td>
<td>48.0%</td>
<td></td>
</tr>
<tr>
<td>No Panic Disorder Diagnosis (n = 480)</td>
<td>29.6%</td>
<td>70.4%</td>
<td>&lt; .02</td>
</tr>
</tbody>
</table>
Panic Attack Status ($n = 511$)

| Panic Attack (within past month) ($n = 87$) | 46.0% | 54.0% |
| No Panic Attack (within month) ($n = 424$) | 27.8% | 72.2% | < .001 |

Trait Anxiety ($n = 517$)

| 41.0 (11.2) | 39.0 (10.2) | < .05 |

Planning Status* ($n = 382$)

| Planned Pregnancy ($n = 86$) | 32.6% | 67.4% |
| Unplanned Pregnancy ($n = 296$) | 30.7% | 69.3% | ns |

Trimester* ($n = 403$)

| 30.8% | 69.2% |
| Second Trimester ($n = 136$) | 28.7% | 71.3% |
| Third Trimester ($n = 51$) | 41.2% | 58.8% | ns |

* Indicates data was used for pregnant sample only

Univariate Analyses

_Hypothesis One_: The first hypothesis predicted that non-pregnant women would be more likely than pregnant women to meet diagnostic criteria for Panic Disorder and/or have had a panic attack within the past month. As can be seen in Table 6, 9.8% of non-pregnant women met diagnostic criteria for Panic Disorder, while only 3.4% of pregnant women did. A 2 x 2 chi-square analysis revealed this was a significant difference, $\chi^2$ (1,
$N = 507) = 8.1, p < .005$. Similarly, while 28.3% of non-pregnant women reported having had at least one panic attack within the past month, only 13.2% of pregnant women reported having a panic attack within the past month. A 2 x 2 chi-square analysis revealed that this was also a significant difference, $\chi^2 (1, N = 513) = 15.5, p < .0005$.

These results support the first hypothesis of the present study.

Table 6

**Panic Disorder and Past Month Panic Attack by Pregnancy Status**

<table>
<thead>
<tr>
<th></th>
<th>Pregnant %</th>
<th>Non-Pregnant %</th>
<th>Total %</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Panic Disorder Diagnosis</td>
<td>3.4%</td>
<td>9.8%</td>
<td>4.9%</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>% Panic Attack (past month)</td>
<td>13.2%</td>
<td>28.3%</td>
<td>17.0%</td>
<td>&lt; .0005</td>
</tr>
</tbody>
</table>

**Hypothesis Two:** The second hypothesis predicted there would be no differences in trait anxiety between pregnant and non-pregnant women. An independent samples t-test was used to examine whether pregnancy status had an effect on level of trait anxiety. As shown in Table 7, results revealed there were no significant differences in trait anxiety levels between pregnant and non-pregnant women, $t (517) = -0.5$. These results support the second hypothesis of the present study.
Table 7

*Trait Anxiety by Pregnancy Status (n = 519)*

<table>
<thead>
<tr>
<th></th>
<th>Pregnant (n = 391)</th>
<th>Non-Pregnant (n = 128)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait Anxiety Level</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>39.5 (10.5)</td>
<td>40.0 (10.6)</td>
<td>ns</td>
</tr>
</tbody>
</table>

*Hypothesis Three:* The third hypothesis predicted that both pregnant and non-pregnant women with Panic Disorder and/or a panic attack within the past month would have higher trait anxiety compared to women without Panic Disorder and/or a panic attack within the past month. As shown in Table 8, participants who met diagnostic criteria for Panic Disorder had higher trait anxiety than participants who did not meet diagnostic criteria for Panic Disorder. This difference was tested using an independent samples t-test, and was shown to be significant, \( t (505) = 5.2, p < .0005 \). Thus, the data support the notion of a relationship between trait anxiety and Panic Disorder.

Participants who reported having a panic attack within the past month also had higher trait anxiety than participants who reported no panic attack within the past month. This difference was tested using an independent samples t-test, and was shown to be significant, \( t (511) = 7.7, p < .0005 \), supporting the notion of a relationship between trait anxiety and panic attacks. These results support the third hypothesis of the present study.
Table 8

*The Relationships between Trait Anxiety, Panic Disorder, and Recent Panic Attacks*

<table>
<thead>
<tr>
<th></th>
<th>Trait Anxiety</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td>Panic Disorder Status (n = 507)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panic Disorder (n = 25)</td>
<td>49.8 (9.5)</td>
<td></td>
</tr>
<tr>
<td>No Panic Disorder (n = 482)</td>
<td>38.9 (10.3)</td>
<td>&lt;.0005</td>
</tr>
<tr>
<td>Panic Attack Status (n = 513)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panic Attack in Past Month (n = 87)</td>
<td>47.0 (9.4)</td>
<td></td>
</tr>
<tr>
<td>No Panic Attack (n = 426)</td>
<td>38.0 (10.1)</td>
<td>&lt;.0005</td>
</tr>
</tbody>
</table>

*Multivariate Analyses.*

_Hypothesis Four:_ To examine whether Panic Disorder, panic attacks, and trait anxiety contribute significantly, above and beyond demographics, to the prediction of risk drinking, and whether pregnancy status moderates this association, a hierarchical multiple regression/correlation (MRC) analysis with an interaction was computed using a continuous criterion variable (i.e., quantity/frequency of drinking in the past 30 days) and a logistic regression was computed using a categorical criterion variable (i.e., TWEAK [risk vs not at risk]). Multicollinearity (high intercorrelations between related independent variables) can create problems in regression models, including very large standard errors and confidence intervals that are too large to be of value (Cohen, Cohen, West, & Aiken, 2003). To control for multicollinearity between the two panic variables,
separate regression analyses were performed to include either Panic Disorder or past month panic attack. Since trait anxiety was a continuous variable and was included in an interaction term, it was centered around the mean (the mean was subtracted from each score) for all hierarchical MRC analyses. Age was also centered for the regression analyses containing interactions. Centering a continuous variable can help reduce nonessential multicollinearity and make results easier to interpret (Cohen, Cohen, West, & Aiken, 2003). Main effects and interaction terms for Panic Disorder, having a panic attack within the past month, and trait anxiety were assessed. Interaction terms were created by products of pregnancy status with Panic Disorder, panic attacks, and trait anxiety. The significance of the interactive model was assessed by comparing the resulting $R^2$ with that achieved from the simple main effects using an $F$ test.

Hierarchical multiple regression/correlations (MRC) and logistic regressions were selected because independent variables can go into the regression in a pre-determined order. Thus, these analyses will show whether Panic Disorder, panic attacks within the past month, and trait anxiety contribute significantly, above and beyond demographic variables, to the prediction of risk drinking. Only the variables that were significant during the initial statistical comparisons were included in the regression analyses. Hierarchical and logistic regressions were also selected because they provide: 1) the significance and magnitude of contribution of each variable in a model, 2) the relative risk or increased chance of being a risk drinker associated with each variable, 3) the significance of an overall model, and 4) the logistic regressions will provide the percent
of risk drinkers correctly classified by the logistic regression model (Cohen, Cohen, West, & Aiken, 2003).

Quantity/Frequency of Past 30 Day Alcohol Use. A continuous criterion variable (i.e., quantity/frequency of alcohol use over the past 30 days) was used in the hierarchical MRC. Variables that were significant from previous analyses were entered into the regression. Independent variables were entered in the following order for the hierarchical multiple regression analysis: (Step 1) age (mean-centered), employment status (0 = working/in school, 1 = unemployed/disabled/ not working outside the home); (Step 2) Panic Disorder status (1 = diagnosis, 0 = no diagnosis), trait anxiety (mean-centered), pregnancy status (0 = pregnant, 1 = non-pregnant); and (Step 3) interaction between Panic Disorder and pregnancy status, interaction between trait anxiety and pregnancy status.

Table 9 shows the results of a hierarchical multiple regression/correlation (MRC) analysis with an interaction that was computed to examine whether Panic Disorder and trait anxiety predict risk drinking (i.e., quantity/frequency of past 30 day alcohol use), and whether pregnancy status moderates this relationship. In step 1 of the regression, age and employment status together accounted for 2.7% of the variance in quantity/frequency of alcohol consumption in the past 30 days ($F_{2,493} = 6.8, p < .001$). After controlling for demographics, the addition of Panic Disorder, trait anxiety, and pregnancy status into the equation in step 2 were significant predictors and accounted for over five percent of the variance in quantity/frequency of past 30 day alcohol use ($\Delta R^2 = 5.5\%; \Delta F_{3,490} = 9.8, p < .0005$). Having Panic Disorder, having higher trait anxiety, and being non-pregnant
were all associated with increased quantity/frequency of past 30 day alcohol use in step 2. The interaction between trait anxiety and pregnancy status was significant and accounted for over two percent of the variance above main effects ($\Delta R^2 = 2.2\%$; $\Delta F_{2,488} = 6.0$, $p < .003$). As shown in Figure 1, the interaction revealed that non-pregnant and pregnant women with low trait anxiety (1 SD below the mean) had similar levels of quantity/frequency of past 30 day alcohol use (0.05 drinks and 0.25 drinks, respectively); however, non-pregnant women with high trait anxiety (1 SD above the mean) had a significantly greater quantity/frequency of past 30 day alcohol consumption than pregnant women with high trait anxiety (14.75 drinks and 2.35 drinks, respectively). The interaction between Panic Disorder and pregnancy status pregnancy status was not significant; thus pregnancy did not moderate the influence of Panic Disorder on quantity/frequency of past 30 day alcohol use. The final regression model was statistically significant and accounted for over ten percent of the variance in quantity/frequency of past 30 day alcohol consumption ($\Delta R^2 = 10.4\%$; $F_{7,488} = 8.1$, $p < .0005$).
Table 9

Summary of Hierarchical Regression Analysis with Quantity/Frequency of Past 30 Day Alcohol Use as a Dependent Variable and Pregnancy Status as a Moderator (N = 496)

<table>
<thead>
<tr>
<th>Variable</th>
<th>$r$</th>
<th>$B$</th>
<th>$SE B$</th>
<th>$β$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.14</td>
<td>0.38</td>
<td>0.12</td>
<td>0.15</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Employment Status (Unemployed)</td>
<td>0.08</td>
<td>3.38</td>
<td>1.80</td>
<td>0.09</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panic Disorder</td>
<td>0.16</td>
<td>8.03</td>
<td>4.07</td>
<td>0.09</td>
<td>&lt; .05</td>
</tr>
<tr>
<td>Mean Centered Trait Anxiety</td>
<td>0.18</td>
<td>0.29</td>
<td>0.08</td>
<td>0.15</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Pregnancy Status (Non-Pregnant)</td>
<td>0.17</td>
<td>6.20</td>
<td>2.26</td>
<td>0.13</td>
<td>&lt; .006</td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panic Disorder x Pregnancy</td>
<td>0.18</td>
<td>1.98</td>
<td>8.22</td>
<td>0.02</td>
<td>ns</td>
</tr>
<tr>
<td>Trait Anxiety x Pregnancy</td>
<td>0.24</td>
<td>0.64</td>
<td>0.20</td>
<td>0.17</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

Note. Adj$R^2 = 2.7\%$ for Step 1 ($p < .001$); $\Delta R^2 = 5.5\%$ for Step 2 ($p < .0005$), $\Delta R^2 = 2.2\%$ for Step 3 ($p < .003$), Overall $\Delta R^2 = 10.4\%$ ($p < .0005$).
Figure 1. Regression lines showing an interaction revealing non-pregnant and pregnant women with low trait anxiety had similar levels of quantity/frequency of past 30 day alcohol use; however, non-pregnant women with high trait anxiety had a significantly greater quantity/frequency of past 30 day alcohol consumption than pregnant women with high trait anxiety.
As shown in Table 10, a hierarchical multiple regression/correlation (MRC) analysis with an interaction was computed to examine whether panic attacks and trait anxiety predict quantity/frequency of past 30 day alcohol use, and whether pregnancy status moderates this relationship. In step 1 of the regression, age and employment status together accounted for 2.7% of the variance in quantity/frequency of alcohol consumption in the past 30 days ($F_{2,493} = 6.8$, $p < .001$).

After controlling for demographics, the addition of past month panic attacks, trait anxiety, and pregnancy status into the equation in step 2 were significant predictors and accounted for almost five percent of the variance in quantity/frequency of past 30 day alcohol use ($\Delta R^2 = 4.8\%; \Delta F_{3,490} = 8.5$, $p < .0005$). In this analysis, having higher trait anxiety, and being non-pregnant were associated with increased quantity/frequency of past 30 day alcohol use in step 2. However, having had a panic attack within the past month was not significantly related to quantity/frequency of past 30 day alcohol use in step 2. The interaction between trait anxiety and pregnancy status was significant, similar to the interaction from the previous analysis, and accounted for over two percent of the variance above main effects ($\Delta R^2 = 2.6\%; \Delta F_{2,488} = 7.2$, $p < .001$). The interaction between panic attacks and pregnancy status was not significant; thus pregnancy did not moderate the influence of a panic attack within the past month on quantity/frequency of past 30 day alcohol use. The final regression model was statistically significant and accounted for over ten percent of the variance in quantity/frequency of past 30 day alcohol consumption ($\Delta R^2 = 10.1\%; F_{7,488} = 7.8$, $p < .0005$).
Table 10

Summary of Hierarchical Regression Analysis with Quantity/Frequency of Past 30 Day Alcohol Use as a Dependent Variable and Pregnancy Status as a Moderator (N = 496)

<table>
<thead>
<tr>
<th>Variable</th>
<th>r</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.14</td>
<td>0.38</td>
<td>0.12</td>
<td>0.15</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Employment Status (Unemployed)</td>
<td>0.08</td>
<td>3.38</td>
<td>1.80</td>
<td>0.09</td>
<td>ns</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panic Attack</td>
<td>0.10</td>
<td>0.23</td>
<td>2.53</td>
<td>0.00</td>
<td>ns</td>
</tr>
<tr>
<td>Mean Centered Trait Anxiety</td>
<td>0.18</td>
<td>0.32</td>
<td>0.09</td>
<td>0.17</td>
<td>&lt; .0005</td>
</tr>
<tr>
<td>Pregnancy Status (Non-Pregnant)</td>
<td>0.17</td>
<td>6.64</td>
<td>2.27</td>
<td>0.14</td>
<td>&lt; .004</td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panic Attack x Pregnancy</td>
<td>0.14</td>
<td>-3.86</td>
<td>5.28</td>
<td>-0.05</td>
<td>ns</td>
</tr>
<tr>
<td>Trait Anxiety x Pregnancy</td>
<td>0.24</td>
<td>0.76</td>
<td>0.20</td>
<td>0.20</td>
<td>&lt; .0005</td>
</tr>
</tbody>
</table>

Note. Adj$R^2 = 2.7\%$ for Step 1 ($p < .001$); $\Delta R^2 = 4.8\%$ for Step 2 ($p < .0005$), $\Delta R^2 = 2.6\%$ for Step 3 ($p < .001$), Overall $\Delta R^2 = 10.1\%$ ($p < .0005$).
Since pregnancy planning status was significant at initial analysis, a separate hierarchical MRC was computed to examine whether Panic Disorder, a panic attack within the past month, and trait anxiety predict quantity/frequency of past 30 day alcohol use in pregnant women. Independent variables were entered in the following order for the hierarchical multiple regression analysis: (Step 1) age, employment status, planning status (0 = planned pregnancy, 1 = unplanned pregnancy); (Step 2) Panic Disorder status, trait anxiety. As shown in Table 11, in step one, age, employment status, and whether the pregnancy was planned or unplanned significantly predicted almost five percent of the variance in quantity/frequency of alcohol consumption in the past 30 days ($\Delta R^2 = 4.9\%$; $F_{3,369} = 6.3, p < .0005$). After controlling for demographics, the addition of Panic Disorder and trait anxiety into the equation in step 2 were significant predictors and accounted for three percent of the variance in quantity/frequency of past 30 day alcohol use ($\Delta R^2 = 3.0\%$; $F_{2,367} = 6.0, p < .003$). The final regression model was statistically significant and accounted for almost eight percent of the variance ($\Delta R^2 = 7.9\%$; $F_{5,367} = 6.3, p < .0005$), with age, employment status, and trait anxiety predictive of quantity/frequency of past 30 day alcohol use among pregnant women. In the final model, being older, being unemployed, and having higher trait anxiety were significant predictors of greater quantity/frequency of alcohol use during the past 30 days. Having Panic Disorder did not contribute to variance of quantity/frequency of past 30 day alcohol use among pregnant women. Also, having had a panic attack within the past month also did not contribute significantly, above and beyond demographics, to the prediction of Quantity/frequency of past 30 day alcohol use (data not shown).
Table 11

*Summary of Hierarchical Regression Analysis with Quantity/Frequency of Past 30 Day Alcohol Use as a Dependent Variable for Pregnant Women Only (N = 373)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>r</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.15</td>
<td>0.29</td>
<td>0.09</td>
<td>0.16</td>
<td>&lt; .002</td>
</tr>
<tr>
<td>Employment Status (Unemployed)</td>
<td>0.13</td>
<td>2.68</td>
<td>1.05</td>
<td>0.13</td>
<td>&lt; .02</td>
</tr>
<tr>
<td>Planning Status (Planned Pregnancy)</td>
<td>-0.08</td>
<td>-2.61</td>
<td>1.27</td>
<td>-0.11</td>
<td>&lt; .04</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panic Disorder</td>
<td>0.13</td>
<td>5.20</td>
<td>2.90</td>
<td>0.10</td>
<td>ns</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>0.16</td>
<td>0.13</td>
<td>0.05</td>
<td>0.14</td>
<td>&lt; .009</td>
</tr>
</tbody>
</table>

Note. Adj$R^2 = 4.9\%$ for Step 1 ($p < .0005$); Δ$R^2 = 3.0\%$ for Step 2 ($p < .003$); Overall Δ$R^2 = 7.9\%$ ($p < .0005$).

*TWEAK Cutoff.* A logistic regression was computed to examine whether Panic Disorder, panic attacks, and trait anxiety, predicts those who are at-risk for problematic drinking (i.e., TWEAK cutpoint ≥ 2). No interaction term was added because pregnancy status was not significant during initial analyses. Separate regression analyses were performed to include either Panic Disorder or past month panic attacks in the model. Based on univariate analyses, race was the only demographic variable that was significant for TWEAK scores.
As shown in Table 12, race was entered into the initial block to control for its predictive value while panic attacks and trait anxiety, were entered into the second block. The overall predictive model for block one (model $\chi^2 = 30.0, p < .0005$) and block two were statistically significant (model $\chi^2 = 40.8, p < .0005$). In the final model, both race and having had a panic attack within the past month were significantly related to the likelihood of being identified as at-risk for problematic drinking (i.e., TWEAK cutpoint $\geq 2$). The risk for problematic alcohol use was three times greater for Caucasian as compared to African-American women (odds ratio = 3.0). Women who reported having had a panic attack within the past month were almost two times more likely to be at-risk for problematic drinking compared to those who reported not having a panic attack (odds ratio = 1.9). The overall model was also significant, accounting for 10.9% of the variance and correctly predicting 69.7% of cases. However, having Panic Disorder did not contribute significantly, above and beyond demographic, to the prediction of scoring above the TWEAK cutoff score (data not shown).
Table 12

*Summary of Logistic Regression Analysis with TWEAK Scores of Two or Greater*

*(N = 509)*

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>( b^\dagger )</th>
<th>Wald</th>
<th>Odds Ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td></td>
<td>(95% CI)</td>
<td></td>
</tr>
<tr>
<td>Race (Caucasian/African-American)</td>
<td>1.1</td>
<td>28.7</td>
<td>3.0 (2.0, 4.5)</td>
<td>&lt; .0005</td>
</tr>
<tr>
<td>Past Month Panic Attack (Yes/No)</td>
<td>0.6</td>
<td>5.8</td>
<td>1.9 (1.1, 3.2)</td>
<td>&lt; .02</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>0.0</td>
<td>1.8</td>
<td>1.0 (0.9, 1.0)</td>
<td>ns</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.9</td>
<td>19.9</td>
<td>0.2</td>
<td>&lt; .0005</td>
</tr>
</tbody>
</table>

Block One: -2 Log Likelihood 600.6

Nagelkerke R Square 8.0%

Block One: Model Chi Square 30.0 < .0005

Block One: Overall rate of correct classification 69.0%

Block Two: -2 Log Likelihood 589.7

Nagelkerke R Square 10.9%

Block Two: Model Chi Square 40.8 < .0005

Block Two: Overall rate of correct classification 69.7%

Note: \( ^\dagger \) Unstandardized logistic regression coefficient
Discussion

The purpose of the present study was to examine differences in rates of current Panic Disorder, panic attacks, and trait anxiety between pregnant and non-pregnant women receiving care at an urban OB/GYN clinic. The study also examined correlates and differences in alcohol use and at-risk drinking among these women. The study further assessed whether meeting diagnostic criteria for Panic Disorder, having had a panic attack within the past month, and trait anxiety influence alcohol use and at-risk drinking among women, and whether pregnancy status moderates these associations.

Summary of Findings

As predicted, the present study found that pregnant women were less likely than non-pregnant women to have Panic Disorder. Pregnant women were also less likely than non-pregnant women to report having had a panic attack within the past month. While there were no differences in trait anxiety levels between pregnant and non-pregnant women, women with Panic Disorder or a recent panic attack reported higher trait anxiety compared to women without Panic Disorder and/or a recent panic attack, regardless of pregnancy status.

The current also study found that Panic Disorder and higher trait anxiety were significant predictors of quantity/frequency of past 30 day alcohol use in both pregnant and non-pregnant women. Pregnant and non-pregnant women with low trait anxiety had a similar level of quantity/frequency of past 30 day alcohol use; however, non-pregnant women with high trait anxiety reported a significantly higher quantity/frequency of past 30 day alcohol use than pregnant women with high trait anxiety. Whether or not these
women were pregnant did not affect the influence of Panic Disorder on quantity/frequency of past 30 day alcohol use. Among pregnant women, being older, unemployed, and having higher trait anxiety were significant predictors of greater quantity/frequency of past 30 day alcohol use.

Caucasian race was found to be a significant predictor of being at-risk for problematic drinking. After controlling for demographics, having had a panic attack within the past month was related to being at-risk for problematic alcohol use.

Discussion of findings

Panic Disorder

Consistent with several previous studies (e.g., Altemus & Brogran, 2004; Klein, Skrobala, Garfinkel, 1995), the current study found that non-pregnant women were nearly 3 times more likely than pregnant women to meet DSM-IV diagnostic criteria for Panic Disorder. These findings suggest pregnancy might be a protective period for women with Panic Disorder. One theory behind this finding, as suggested by Klein (1993), is based on the fact that the respiratory stimulant effect of placental progesterone results in maintained low levels of $\text{PCO}_2$ and bicarbonate throughout pregnancy (Klein, et al., 1995). Klein (1993) contends that while a low $\text{PCO}_2$ and bicarbonate level in non-pregnant women with Panic Disorder signifies chronic hyperventilation resulting from a low suffocation alarm threshold, this may not be the case for pregnant women. On the contrary, during pregnancy, it is progesterone’s respiratory stimulation, not a suffocation threshold abnormality, that results in lowered $\text{PCO}_2$ and bicarbonate levels; therefore, the greater difference between $\text{PCO}_2$ and the suffocation alarm threshold makes women less
likely to experience panic resulting from a false suffocation alarm during pregnancy (Klein, 1993).

Few studies have examined the prevalence of Panic Disorder in OB/GYN clinics, particularly among pregnant patients. However, the prevalence found among pregnant women in the present study (3.4%) is consistent with findings from an earlier study that showed 2% of low income pregnant patients in an OB/GYN clinic met Panic Disorder criteria (Smith, et al., 2004). The present study also corresponds with the 3% prevalence of Panic Disorder found in seven different OB/GYN clinics, in which 37% of these OB/GYN patients were pregnant or had recently given birth. Even though their OB/GYN clinic findings included some non-pregnant patients, Spitzer and colleagues (2000), nonetheless found that primary care patients were two times more likely to meet criteria for Panic Disorder than OB/GYN patients. Thus, the current study represents the first cross-sectional study to compare Panic Disorder prevalence between pregnant and non-pregnant patients attending the same OB/GYN clinic. Additional research is needed to further confirm the lower prevalence of Panic Disorder among pregnant women attending OB/GYN clinics.

Over the past 25 years, lifetime prevalence rates for Panic Disorder have ranged from 1 to 4.7%, and women are more commonly diagnosed with the disorder than are men (e.g., Kessler, Berglund, et al., 2005; Katschnig & Amering, 1998; Reed & Wittchen, 1998). However, Panic Disorder in primary care settings is higher than that found in the general population (Roy-Byrne, Wagner, & Schraufnagel, 2005; Klerman, Weissman, Ouellette, Johnson, & Greenwald, 1991). This finding helps explain the
higher than expected rate of Panic Disorder among non-pregnant women in the present study (9.8%). Similar rates have been reported in other non-pregnant female patient populations, such as one study with female patients attending an urban general medicine practice that found 9.2% of patients met criteria for Panic Disorder (Olfsan, et al., 2000). Likewise, Barsky and colleagues (1999) reported a one-month rate of Panic Disorder that ranged between 6.7-8.3%, and a lifetime rate ranging between 9.1-11.2%, in general medical settings.

People with Panic Disorder have higher rates of physician visits and emergency room walk-in visits a year, and utilize primary care services at 3 times the rate of other psychiatric groups (Barksy, Delamater, & Orav, 1999). Detection and treatment of Panic Disorder among primary care patients is important, as it is one of the more costly and impairing anxiety disorders, and of specific matter to health care providers (Roy-Byrne, Wagner, & Schraufnagel, 2005). People with Panic Disorder are likely to utilize primary care services to a greater extent than other psychiatric and non-psychiatric groups, usually presenting with specific somatic problems (Barsky, Delamater, & Orav, 1999), which may help explain the higher rates of Panic Disorder found among the non-pregnant patient populations in this and other research. Research suggests that identification of Panic Disorder is important in primary care settings because patients with this disorder are high users of general and specialty healthcare and average a greater number of visits to medical settings. These patients may present a significant challenge for healthcare providers (e.g., more medically inexplicable complaints, lower self-reported physical health ratings, greater minor medical complaints), yet only a small portion of Panic
Disorder patients are accurately detected and treated (Roy-Byrne, Wagner, & Schraufnagel, 2005; Barsky, Delamater, & Orav, 1999).

Panic Attacks

As stated previously in the Statement of Problems and Hypothesis section, a diagnosis of Panic Disorder was expected in only a small proportion of the total sample (approximately 4.9%). In order to increase power, a single screening question for panic attacks (i.e., “In the last 4 weeks, have you had an anxiety attack, suddenly feeling fear or panic?”) was used as a subthreshold marker for Panic Disorder.

It is important to note that while panic attacks are among the most severe and incapacitating type of anxiety reactions (Norton, Cox, & Malan, 1990), panic attacks occur in various other anxiety disorders (e.g., Social Phobia, Generalized Anxiety Disorder) and are not solely indicative of Panic Disorder (APA, 2000). In addition, Brown and Deagle (1992) suggested self-report questionnaire measures of panic attacks produce a higher amount of false positives. Thus, the current findings must be interpreted with caution because of the possibility of false positives in the group of participants who reported having had a panic attack within the past month.

A panic attack, by itself, is not a diagnosable disorder, making epidemiological prevalence rates difficult to obtain. The present study, however, found 17.0% of all participants reported having had a panic attack within the past month. This statistic is within range of estimates reported elsewhere. Norton, Cox, and Malan (1992), for example, compared 10 studies that used questionnaires to assess the prevalence panic attacks, and found between 11-29% of participants reported a past month panic attack.
They also found that rates of panic attacks were reasonably consistent across definitional categories used in research (e.g., requiring a spontaneous panic attack vs requiring at least four symptoms vs a screening question about having a “sudden” panic episode [similar to the screening question used in the present study]). Furthermore, the researchers noted that the average prevalence of individuals reporting the required amount of panic attacks to meet DSM diagnosed Panic Disorder (3.4%) across these studies was consistent with epidemiological reports on the prevalence of Panic Disorder (Norton, Cox, & Malan, 1992). Thus, findings from previous studies, as well as the current study, suggest questionnaire measures of panic prevalence may be accurate, and may provide a suitable way for evaluating panic attacks related to anxiety disorders.

Consistent with previous studies in the area (e.g., George, Ladenheim, & Nutt, 1987), the present study found non-pregnant women were 2 times more likely than pregnant women to have a recent panic attack. This finding helps support the earlier notion that pregnancy may be a protective period for women with panic. Northcott and Stein (1994) retrospectively examined women with Panic Disorder and found that 43% of pregnancies were associated with improvement in panic symptoms. While the present study was cross-sectional, and the previous study longitudinal, both findings suggest pregnancy may be protective against panic.

**Trait Anxiety**

The current study found that mean trait anxiety scores did not differ between pregnant and non-pregnant women (39.5 and 40.0, respectively). These scores are consistent with published norms for the STAI. According to Spielberger (1983), the
normal trait anxiety score for non-pregnant healthy women between the ages of 19 and 39 is 36.2 ($SD = 9.5$) and the mean score for non-pregnant healthy women aged between 40 to 49 years old is 35 ($SD = 9.3$). Our findings are also consistent with several previous studies suggesting that trait anxiety remains relatively stable during pregnancy (Monk, Myers, Sloan, Ellman, & Fifer, 2003; Sjöström, Valentin, Thelin, & Maršál, 1997; Albrecht & Rankin, 1989). Findings are also compatible with the theory that trait anxiety is a relatively stable personality variable and should therefore not change during pregnancy.

**Panic Disorder, Panic Attacks, and Trait Anxiety**

Lending support to the predictions and rationale laid out in the literature review, and consistent with several previous studies in the area (Chambers, Power, & Durham, 2004; Kennedy, Schwab, Morris, & Beldia, 2001), the present study showed that participants who met diagnostic criteria for Panic Disorder had higher trait anxiety than participants who did not meet diagnostic criteria for Panic Disorder. Mean trait anxiety scores for women who had Panic Disorder in the present study ($M = 49.8$) were similar to previous research that examined trait anxiety scores among females with Panic Disorder. For example, Oei, Wanstell, and Evans (1990) also found a mean score of 48.8 among female Panic Disorder patients. Foot and Koszycki (2004) found trait anxiety levels in Panic Disorder patients to be significantly higher than trait anxiety levels seen in normative samples. These studies suggest that trait anxiety as measured by the STAI, is useful for anxiety disorder patients, particularly those with Panic Disorder.
It has been suggested that trait anxiety may be a valuable predictor of both current and future panic. Plehn and Peterson (2002) proposed that trait anxiety may help with the detection of people at-risk for Panic Disorder. These researchers found undergraduate students with high trait anxiety were more likely to subsequently develop Panic Disorder than students with low trait anxiety at 11-year follow up. These findings point to the importance of using measures of trait anxiety to identify those at risk for developing Panic Disorder, as well as directing prevention efforts to those with high trait anxiety in order to reduce the occurrence of full-blown Panic Disorder.

Furthermore, consistent with previous research (e.g., Whittal, Suchday, & Goetsch, 1994), the current study found that participants who reported having had a panic attack within the past month had higher trait anxiety scores \((M = 47.0)\) than participants who reported no panic \((M = 38.0)\). Other research has shown that panickers, regardless of whether the panic attack was expected or unexpected, had higher trait anxiety scores \((M = 43.1)\) than non-panickers \((M = 38.2)\) (Brown & Deagle, 1992). These findings suggest trait anxiety is one way to distinguish between panickers and non-panickers.

The present study also supports previous evidence that nonclinical and clinical panickers (i.e., those with infrequent versus those with frequent panic attacks) have similar trait anxiety levels, which has several important implications. Norton, Harrison, Hauch, and Rhodes (1985) suggested that because nonclinical panickers share similarities with panickers who have Panic Disorder, the larger sample size of nonclinical panickers can offer greater insight into the etiology of panic and its treatment. Secondly, in accordance with Plehn and Peterson's (2002) research, there may be a natural
development from nonclinical panic symptoms to more severe Panic Disorder. If this is the case, there may be a way to intervene before nonclinical (infrequent) panic symptoms progress to Panic Disorder. Examining factors such as trait anxiety and panic in nonclinical panickers may provide useful information relevant to the etiology of Panic Disorder.

_Alcohol Problems_

Consistent with previous studies in the area that suggest alcohol use declines after pregnancy recognition in most women (e.g., Floyd, Decouflé, & Hungerford, 1999; Bearer, 2001; Chang, 2001), initial analyses from the current study revealed that non-pregnant women reported rates of consumption 4 to 5 times higher than those of pregnant women. One must also keep in mind, however, that accurate reports of current alcohol use during pregnancy can be complicated by denial from the mothers, due to social stigma attached to perinatal drinking. For example, Alvik and colleagues (2006) found women reported higher rates of alcohol consumption during pregnancy when asked postpartum rather than prenatally.

While current pregnancy status influenced quantity/frequency of past 30 day alcohol use, pregnancy status did not influence the likelihood of being identified as at-risk for problematic alcohol use. This finding makes sense because the TWEAK is recognized as a valuable tool for screening for alcohol problems among non-pregnant and pregnant women, as well as in general and clinical populations (Cherpitel, 1997). Thus, one would expect, as our results suggest, that the TWEAK screening instrument would detect the likelihood of being at-risk for problematic drinking, regardless of current
pregnancy status. The present study found approximately one third of both pregnant and non-pregnant women were identified as being at-risk for problematic drinking. Risk drinking (i.e., prenatal drinking at levels that put the fetus at risk) was once identified as maternal alcohol consumption of 1 ounce or more (Sokol, et al., 1989), but the latest findings confirm that even lower levels of alcohol use can cause adverse pregnancy outcomes (Day & Richardson, 2004; Chang, 2001). Moreover, there is currently no minimum amount of alcohol that is considered safe during pregnancy (Day & Richardson, 2004).

Expectedly, the present study found that women who scored above the TWEAK cutoff reported rates of consumption over 7 times higher than those women who scored below the TWEAK cutoff. These findings lend support to the ability of TWEAK to detect greater alcohol consumption. They also uphold the notion that TWEAK detects women at-risk for problematic drinking, regardless of current pregnancy status, since higher amounts of alcohol consumption was reported by women who met the TWEAK cutoff.

**Demographics and Quantity/Frequency of Alcohol Use.** Demographics at initial analysis suggest that age and employment status were both associated with quantity/frequency of past 30 day alcohol use. Our findings suggest that older age was associated with greater alcohol use. These results correspond with previous research that found older pregnant women were both more likely to drink alcohol (Haynes, Dunnagan, & Christopher, 2003) and consume greater quantities of alcohol than their younger counterparts (O’Conner & Whaley, 2006). Kost and colleagues (2003), who reported
similar findings after controlling for planned versus unplanned pregnancy, suggested the possibility that because drinking habits may be there longer for older women, perhaps it would be more difficult to stop drinking for these women than for their younger counterparts. Results are not uniformly consistent, however, as Moore and colleagues (2005) found decreasing levels of alcohol with increasing age. The present study dealt with a relatively younger cohort (average age 27.6, SD = 2.4), which may contribute to the inconsistent results. The importance of the relationship between older age and greater alcohol use in women of childbearing age is particularly relevant when one considers the fact that births to older women in the United States is on the rise (Hamilton, Ventura, Martin, & Sutton, 2005).

In addition to older age, the present study also found that women who were unemployed (i.e., unemployed, disabled, or not working outside the home) reported rates of consumption 2 to 3 times higher than those of employed women (i.e., either working or in school). This finding is consistent with previous research (Leonardson & Loudenburg, 2003) showing unemployment to be a risk factor for drinking during the past 30 days or having reported existing or previous drinking problems in pregnant women. Unemployment has also been shown to be a particular risk factor for alcohol problems in African-American women (Galvan & Caetano, 2003).

Pregnancy planning status was related to alcohol use in the present study. Initial analysis showed that pregnant women who reported their current pregnancy had been unplanned reported rates of consumption 4 to 5 times higher than women who reported their current pregnancy was planned. These findings are consistent with previous
research that suggests pregnant women with unplanned pregnancies are at a higher relative risk of alcohol exposure than women with planned pregnancies, particularly during the first trimester (e.g., Han, Nava-Ocampo, & Koren, 2005; Than, et al., 2005). For example, Han and colleagues (2005) found that women with unintended pregnancies were exposed to alcohol at almost twice the rate as those with intended pregnancies. Similarly, Than and colleagues (2005) assessed behaviors reported in the third month of pregnancy and found that women with unintended pregnancies reported greater alcohol use than those with intended pregnancies. Furthermore, women with unplanned pregnancies may be less likely to recognize their pregnancy status right away, thus increasing the likelihood of exposing the fetus to alcohol (Floyd, Decouflé, & Hungerford, 1999).

Demographics and TWEAK. Consistent with previous research (e.g., Flynn, et al., 2003), the present study found that Caucasian women were 3 times more likely be at-risk for problematic than African-American women. Flynn and colleagues (2003) found Caucasian women were 3.7 times more likely to score above the TWEAK cutoff compared to African-American women (Flynn, et al., 2003). These findings also support recent epidemiological data indicating that Caucasian females had a significantly higher prevalence rate of alcohol abuse than their African-American female counterparts (Grant, Dawson, et al., 2004). In addition to racial differences in prevalence rates of risk drinking, research suggests there may also be racial differences in drinking patterns in women (Herd, 1997). For example, Herd (1997) examined racial differences in norms and drinking patterns and found that African-American women endorsed conservative
versus liberal drinking norms for women, and were significantly less likely than
Caucasian women to report permissive drinking standards for women.

Panic, Anxiety, and Alcohol Problems

Another aim of the present study was to examine the relationships between panic, anxiety, and quantity/frequency of past 30 day alcohol use. Consistent with previous research (e.g., King, Bernardy, & Hauner, 2003; Kushner; Grant, Stinson, et al., 2004; Cowley, 1992), initial analyses in the present study showed that Panic Disorder, panic attacks, and high trait anxiety were related with increased past 30 day alcohol consumption. After controlling for demographics, Panic Disorder and higher trait anxiety, but not panic attacks, continued to be significant predictors of increased quantity/frequency of past 30 day alcohol use among women in the present study.

Panic Disorder and Quantity/Frequency of Alcohol Use. Initial analyses showed that women with Panic Disorder reported rates of consumption 5 to 6 times higher than those of women without Panic Disorder. Furthermore, after controlling for demographics, Panic Disorder remained a significant predictor of quantity/frequency of past 30 day alcohol use. While these findings confirm the study hypothesis, and lend support to results from epidemiological surveys and clinical studies showing strong associations between Panic Disorder and Alcohol Use Disorders (e.g., Grant, Stinson, et al., 2004), further research is required with larger sample sizes of both pregnant and non-pregnant women with Panic Disorder for adequate statistical power. Accordingly, these findings should be interpreted with caution and examined with larger sample sizes. Nonetheless, these findings are similar to those of Arch and colleagues (2006), which
recently found Panic Disorder was a significant predictor of frequent drinking among patients attending an urban university-affiliated primary care outpatient clinic.

The causal explanation for the association between Panic Disorder and alcohol problems remains controversial, and it is important to note that the present findings do not establish a causal relationship between Panic Disorder and alcohol consumption. Rather, the data are correlational, and other hypotheses should also be taken into account. However, there are a number of possible etiological models used to try to explain why these problems often co-occur within the same person.

One explanation offered for the co-occurrence is that the panic and anxiety symptoms related to Panic Disorder promotes maladaptive use of alcohol (Kushner, Abrams, & Borchardt, 2000; Cowley, 1992). This view has been referred to as the “self-medication hypothesis,” and suggests the sedative effects of alcohol serve to alleviate aversive panic and anxiety symptoms (Kushner, Abrams, Thuras, & Hanson, 2000). For example, Kushner and colleagues (2000) found a self-medicating pattern of drinking in people with Panic Disorder. Tension-reduction alcohol outcome expectancies was the strongest predictor in drinking behavior among those with Panic Disorder (Kushner, Abrams, Thuras, & Hanson, 2000). Similarly, other researchers have found that a Panic Disorder diagnosis often occurs at an earlier age than alcohol problems among young adults; however, no direct causal link can be inferred from much of the retrospective age-of-onset reports (Zimmermann, et al., 2003). Cowley (1992) suggests that while alcohol may be used to help relieve anxiety and panic for some, prolonged alcohol use and withdrawal may also result in increased anxiety and panic.
A second explanation offered for the co-occurrence of these problems is that pathological alcohol use fosters the development of Panic Disorder (George, Nutt, Dwyer, & Linnoila, 1990). For example, Schuckit and colleagues (1997) found that alcoholics were at an increased risk for developing Panic Disorder and Social Anxiety Disorder. George and colleagues (1990) suggest that repeated alcohol withdrawal episodes may induce panic attacks and anxiety, which eventually occur during sobriety. Likewise, neurochemical processes that may occur during habituation and tolerance may also result in increased arousal, and prompt the person to have panic attacks (George, et al., 1990).

Another explanation for the co-occurrence of these problems is a causal third factor may predispose an individual to have both Panic Disorder and alcohol problems (Zimmernann, et al., 2003; Davids, et al., 2002). Davids and colleagues (2002) suggest that shared causal factors play a role in the development of both disorders, and genetic and/or environmental origins are associated. Patients with panic and alcohol problems had parents with similar syndrome profiles, and in addition to a genetic risk component, environmental factors seemed to influence the development of Panic Disorder, alcoholism, or both (Davids, et al., 2002).

Panic Attacks and Quantity/Frequency of Alcohol Use. Initial analysis in the present study showed that women who reported having a recent panic attack also reported rates of consumption 2 to 3 times higher than those who reported no recent panic attack. This finding lends support to previous research, such as Hayward and colleagues (1997) findings that girls who report panic symptoms also report greater alcohol use than those
who do not. People with recurring panic attacks, but not Panic Disorder, in the community show 17.5% comorbidity with alcohol abuse (Klerman, et al., 1991).

Similarly, research with alcoholic patients shows a high incidence of panic attacks. For example, Cox and colleagues (1989) found a majority of alcoholics inpatients reported having a panic attack within the past year (62.5%) or past three weeks (50.7%), and only one-third of these patients reported never having had a panic attack (Cox, Norton, Dorward, & Fergusson, 1989). Moreover, the majority of these panickers (83.1%) reported using alcohol to self-medicate (i.e., help reduce or prohibit panic attacks), and 72.5% of these patients reported alcohol was effective for this purpose. In addition, female alcoholics were found to have more severe panic than their male counterparts (Cox, et al., 1989).

While initial analyses in the present study suggested a relationship between panic attacks and increased alcohol consumption, after controlling for demographics, having a recent panic attack no longer predicted increased alcohol consumption. However, there are a number of possible reasons that this study was not able to detect differences in alcohol consumption once demographics were controlled. Perhaps inclusion of participants with nonclinical (i.e., infrequent) panic contributed to these non-significant findings. For example, research has shown higher alcohol abuse rates are more common in those with Panic Disorder than in those with less frequent panic (Katerndahl & Realini, 1999). Furthermore, severity, and/or the interpretation or misinterpretation of panic symptoms likely plays a role in whether or not the symptoms become problematic, which may contribute to whether alcohol use will be used to self-medicate. Further research is
required with larger sample sizes of both pregnant and non-pregnant women with panic attacks for adequate statistical power. Accordingly, these findings should be interpreted with caution and examined with larger sample sizes.

*Trait Anxiety and Quantity/Frequency of Alcohol Use.* The present study showed that higher trait anxiety was significantly related with greater alcohol consumption, which remained significant after controlling for demographics. These findings correspond with previous research (e.g., Swensen, et al, 2000; Kushner, Abrams, Thuras, & Hanson, 2000), and suggest trait anxiety predicts a significant tendency to drink alcohol for anxiety management. People with persistent anxiety (high trait anxiety) may be more likely than those with transitory anxiety states, to develop a self-medicating style of drinking (Kushner, Abrams, Thuras, & Hanson, 2000). Trait anxiety levels have also been found to correspond to severity of alcohol dependence (Roberts, et al., 1999).

The present study also supports the notion of a relation between trait anxiety and alcohol consumption during pregnancy, which had only previously been examined in one study before now (Albrecht & Rankin, 1989). The present study further extends those findings by showing that, even after controlling for demographics, trait anxiety continued to be a significant predictor of increased consumption among pregnant women. Given that trait anxiety levels do not change during pregnancy, and that higher trait anxiety is associated with increased alcohol use, the present study was able to support the theory that high trait anxiety would continue to influence alcohol consumption during pregnancy. An interaction showed that while high trait anxiety predicted greater alcohol
use among pregnant women, non-pregnant women with high trait anxiety consumed a greater amount of alcohol than their pregnant counterparts.

*Panic Disorder and TWEAK.* Initial analyses showed that women with Panic Disorder were more likely to score above the TWEAK cutoff than below, indicating that women with Panic Disorder are more likely to also be at-risk for problematic drinking. However, after controlling for demographics, Panic Disorder no longer remained a significant predictor of TWEAK cutoff scores. These findings are similar to findings from Cox and colleagues (1993) who showed that compared to male Panic Disorder patients, alcohol-related factors were less evident among female patients. Another possibility for the non-significant finding is that TWEAK identifies women at-risk for prenatal drinking at levels that put the fetus in danger, and so it is possible that while the women who met TWEAK cutoff scores consumed more alcohol than those who did not meet the TWEAK cutoff scores, the smaller amount of consumption needed to place the fetus at-risk is unrelated to the considerably higher alcohol levels found among women with a Panic Disorder diagnosis. It is also possible that with the limited sample size, the present study was not able detect significant differences in TWEAK cutoff scores among women with Panic Disorder. Further research is required with larger sample sizes of both pregnant and non-pregnant women with Panic Disorder for adequate statistical power. Accordingly, these findings should be interpreted with caution and examined with larger sample sizes.

*Panic Attacks and TWEAK.* Consistent with previous research (e.g., Goodwin, et al., 2004; Hayward, et al., 1997), initial analyses in the present study suggest that women
who experienced a recent panic attack were more likely to be at-risk for problem drinking than were women who reported no recent panic attacks. Moreover, after controlling for demographics, recent panic attacks continued to be related to TWEAK cutoff scores. Those with a recent panic attack were nearly 2 times more likely than those without a recent panic attack to be at-risk for problematic drinking. These results correspond with findings using a community sample of young adults that showed panic attacks are associated with a higher risk for alcohol use problems (Goodwin, et al., 2004). In addition, Cox and colleagues (1989) found a relatively high incident of panic attacks in female alcoholics.

As was discussed earlier, causal explanations for the association between panic attacks and being at-risk for problem drinking, like those between Panic Disorder and alcohol problems, remains controversial. However, the possible etiological models used to try to explain why panic attacks and alcohol problems often co-occur within the same person remain similar to those used to explain why Panic Disorder and alcohol problems are often occur within the same person. To reiterate, one explanation is that panic attacks may serve to promote problematic alcohol use (Kushner, Abrams, & Borchardt, 2000; Cowley, 1992). A second explanation is that problem drinking may foster the development of panic attacks, even when one is sober (George, Nutt, Dwyer, & Linnoila, 1990). A third explanation suggests another factor (e.g., genetic and/or environmental) may predispose an individual to have panic attacks and alcohol problems (Zimmermann, et al., 2003; Davids, et al., 2002).
**Trait Anxiety and TWEAK.** The current study found higher trait anxiety was related with being at-risk for problem drinking at initial analyses. However, contrary to study hypotheses, in the current study, after controlling for demographic, higher trait anxiety was no longer significantly related to being at-risk for problematic drinking. This finding is contradictory to our earlier findings that suggest higher trait anxiety was predictive of increased alcohol use, as well as to a large body of research that suggests trait anxiety predicts a significant tendency to drink alcohol for anxiety management (e.g., Swensen, et al, 2000; Kushner, Abrams, Thuras, & Hanson, 2000). King and colleagues (2003), however, found alcohol dependent females had higher trait anxiety than problematic drinkers, and light drinkers. It is possible that while the TWEAK captures alcohol dependent women, in the present study, it also includes any women who may be likely to drink enough to put the fetus at risk, which may contribute to the non-significant findings.

**Study Implications, Future Directions, and Applications**

The present study has a number of important implications. First, while research had previously found pregnancy to be a protective factor for Panic Disorder and panic symptoms, the current study was the first cross-sectional study to compare pregnant to non-pregnant women in a community clinic. The current study findings confirmed the lower prevalence rate of current Panic Disorder and recent panic attacks among pregnant women. Additional research should be done to confirm the lower prevalence of Panic Disorder and panic symptoms among pregnant women attending OB/GYN clinics. The present study also confirmed previous longitudinal research indicating trait anxiety levels
do not differ between pregnant and non-pregnant women; importantly, the current findings indicate that this personality variable may continue to have a negative impact on health behaviors in both pregnant and non-pregnant women.

Furthermore, current study findings support the need to examine Panic Disorder, panic attacks, and trait anxiety, as potential risk factors for alcohol use among pregnant and non-pregnant women in the community. This is particularly important because historically, research examining Panic Disorder, panic attacks, and trait anxiety as potential risk factors for or correlates of alcohol problems focused primarily, if not exclusively, on men and/or non-pregnant women. The present study was the first one to assess whether there is an association between panic (i.e., Panic Disorder and/or panic attacks) and alcohol consumption in pregnant women. The importance of considering panic and anxiety as possible factors (that either precede or result from) in alcohol use among pregnant women is considerable when one considers the various adverse affects of prenatal alcohol consumption on the mother and fetus, and the fact that no level of alcohol consumption during pregnancy has been deemed safe (e.g., Day & Richardson, 2004). Thus, this research can have enormous implications for assessment and treatment of both alcohol problems and panic.

Additionally, the present study findings indicate that trait anxiety was an important predictor of increased amounts of alcohol use in pregnant and non-pregnant women. While many women reduce or abstain from alcohol use once they find out they are pregnant, unfortunately, others continue to consume alcohol during pregnancy (Morse & Hutchins, 2000). Therefore, it is important to identify women at risk for continued
alcohol use during pregnancy. Before now, only one other study had examined trait anxiety as a factor for greater alcohol use during pregnancy (Albrecht & Rankin, 1989). The current study not only confirmed those findings, but also extended them by showing that even after controlling for demographics higher trait anxiety remained a considerable risk factor for greater alcohol consumption during pregnancy.

**Study Limitations, Strengths, and Future Directions**

The present study had a number of important limitations. First, it was a cross-sectional study and causation cannot be determined. Rather, data are correlational, and so the direction of the relationships (e.g., whether Panic Disorder and/or panic attacks either precede or are the result of greater alcohol consumption) cannot be established.

Second, the study depended on self-report questionnaires. Underreporting is common in women, and particularly among pregnant women, which likely occurred in the current study. The double standards of drinking that view high amounts of alcohol use more negatively for women than men in most cultures may contribute to underreporting use (Wilsnack & Wilsnack, 2002). Problems with self-report measures are well recognized, and can be a particularly important issue for this population given that women are known to underreport alcohol use especially during pregnancy (e.g., Alvik, Haldorsen, Groholt, & Lindemann, 2006). Thus, one should keep in mind that accurate reports of current alcohol consumption during pregnancy may be complicated by denial from the mothers (Alvik, et al., 2006).

Third, as discussed earlier, one important consequence of the limited sample size and the relatively small number of participants with Panic Disorder and/or recent panic
attacks is that statistical power was limited. Clearly, further research is required with larger sample sizes of both pregnant and non-pregnant women with Panic Disorder and panic symptoms for adequate statistical power to detect significant differences in alcohol use between them. Low power becomes a significant issue when trying to detect interaction effects (Cohen, Cohen, West, & Aiken, 2003).

Despite these limitations, there are several important strengths of the current study. First, the differences found in rates of current Panic Disorder, panic attacks, and alcohol use between pregnant and non-pregnant women receiving care at an urban OB/GYN clinic have implications for identification and treatment planning.

Second, this study was the first to assess the interaction between pregnancy status and Panic Disorder, panic attacks, and trait anxiety, on alcohol use and at-risk drinking among women in the community receiving care at an outpatient university-based OB/GYN clinic. Further, the previous research that has examined alcohol consumption and Panic Disorder and/or panic attacks had not included a pregnant population. Thus, this study was the first to examine whether panic and anxiety had similar associations with alcohol use during pregnancy.

Third, the TWEAK measure was used in addition to quantity/frequency of alcohol use measures. The TWEAK is one way to help identify women at-risk for problematic drinking, and the present study found that it identified and related significantly with those women who reported higher amounts alcohol consumption, regardless of current pregnancy status. If nothing else, the TWEAK could at least bring about an excellent opportunity to discuss prenatal alcohol exposure with the pregnant patient (Chang, 2001).
Fourth, the current study suggests panic may be related with greater alcohol use, and that high trait anxiety may help identify women who consume large amounts of alcohol. It further suggests that recent panic attacks may help identify women at-risk for problematic drinking during pregnancy. In addition, this study provides evidence for the importance of conducting future research that examines whether pregnancy status interacts with the associations between Panic Disorder, panic attacks, or trait anxiety and alcohol use. Future research should continue to look at high trait anxiety as a risk factor for greater alcohol consumption in women during pregnancy.

Fifth, the present study used sound statistical analyses, regularly used with research in clinical settings. The study’s participants included a sample of pregnant women in a clinic setting, a population that had not been studied previously with respect to the relationships between alcohol use and panic. Finally, the study used contemporary well-validated measures of panic, trait anxiety, and risk drinking.

In summary, results of the current study suggest that pregnant women are less likely than non-pregnant women to have Panic Disorder and/or panic attacks. While trait anxiety does not differ between pregnant and non-pregnant women, it is higher among those with current Panic Disorder, panic attacks, as well as in those who consume greater amounts of alcohol in both groups of women. In addition, after controlling for demographics, Panic Disorder and higher trait anxiety were significant predictors of greater amounts of alcohol use in both pregnant and non-pregnant women. An interaction revealed that non-pregnant women with high trait anxiety consumed significantly greater amounts of alcohol than pregnant women with high trait anxiety.
The current study did not detect differences between pregnant and non-pregnant women with regard to the association between alcohol consumption and Panic Disorder or panic attacks; however, differences may exist but went undetected in this study. Among pregnant women, being older, unemployed, and having higher trait anxiety are significant predictors of greater amounts of past 30 day alcohol consumption. Furthermore, Caucasian race and recent panic attacks are significant predictors for being at-risk for problematic drinking. Conclusions should be interpreted with caution because this was the first cross-sectional study to examine whether pregnancy status moderates the associations between Panic Disorder, a recent panic attack, and trait anxiety on alcohol use and at-risk drinking. This is certainly an area where additional research is warranted.
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Appendix

PATIENT HEALTH QUESTIONNAIRE

This questionnaire is an important part of providing you with the best health care possible. Your answers will help in understanding problems that you may have. Please answer every question to the best of your ability unless you are requested to skip over a question.

1. During the last 4 weeks, how much have you been bothered by any of the following problems?
   a. Stomach pain..............................
   b. Back pain.................................
   c. Pain in your arms, legs, or joints (knees, hips, etc.)............................... 
   d. Menstrual cramps or other problems with your periods.............................
   e. Pain or problems during sexual intercourse.............................................
   f. Headaches....................................
   g. Chest pain.................................
   h. Dizziness.................................
   i. Fainting spells.............................
   j. Feeling your heart pound or race...........................
   k. Shortness of breath........................
   l. Constipation, loose bowels, or diarrhea..............
   m. Nausea, gas, or indigestion..............

2. Over the last 2 weeks, how often have you been bothered by any of the following problems?
   a. Little interest or pleasure in doing things........
   b. Feeling down, depressed, or hopeless........
   c. Trouble falling or staying asleep, or sleeping too much..........................
   d. Feeling tired or having little energy.................................................
   e. Poor appetite or overeating.................................
   f. Feeling bad about yourself—or that you are a

<table>
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<th>Not bothered</th>
<th>Bothered a little</th>
<th>Bothered a lot</th>
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<th>More than half the days</th>
<th>Nearly every day</th>
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failure or have let yourself or your family down

g. Trouble concentrating on things, such as reading the newspaper or watching television

h. Moving or speaking so slowly that other people could have noticed? Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual

i. Thoughts that you would be better off dead or of hurting yourself in some way

3. Questions about anxiety.

a. In the last 4 weeks, have you had an anxiety attack—suddenly feeling fear or panic?

IF YOU CHECKED “NO”, GO TO QUESTION #5.

b. Has this ever happened before?

c. Do some of these attacks come suddenly out of the blue—that is, in situations where you don’t expect to be nervous or uncomfortable?

d. Do these attacks bother you a lot or are you worried about having another attack?

4. Think about your last bad anxiety attack.

a. Were you short of breath?

b. Did your heart race, pound, or skip?

c. Did you have chest pain or pressure?

d. Did you sweat?

e. Did you feel as if you were choking?

f. Did you have hot flashes or chills?

g. Did you have nausea or an upset stomach, or the feeling that you were going to have diarrhea?

h. Did you feel dizzy, unsteady, or faint?

i. Did you have tingling or numbness in parts of your body?

j. Did you tremble or shake?

k. Were you afraid you were dying?

5. Over the last 4 weeks, how often have you been bothered by any of the following problems?

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<th>Not at all</th>
<th>Several days</th>
<th>More than half the days</th>
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</table>
a. Feeling nervous, anxious, on edge, or worrying a lot about different things. 

IF YOU CHECKED “NOT AT ALL”, GO TO QUESTION #6.

b. Feeling restless so that it is hard to sit still.

c. Getting tired very easily.

d. Muscle tension, aches, or soreness.

e. Trouble falling asleep or staying asleep.

f. Trouble concentrating on things, such as reading a book or watching TV.

g. Becoming easily annoyed or irritable.

6. Questions about eating.

a. Do you often feel that you can’t control what or how much you eat?

b. Do you often eat, within any 2-hr period, what most people would regard as an unusually large amount of food?

IF YOU CHECKED “NO” TO EITHER #A OR #B, GO TO QUESTION #9.

c. Has this been as often, on average, as twice a week for the last 3 months?

7. In the last 3 months have you often done any of the following in order to avoid gaining weight?

a. Made yourself vomit?

b. Took more than twice the recommended dose of laxatives?

c. Fasted—not eaten anything at all for at least 24 hours?

d. Exercised for more than an hour specifically to avoid gaining weight after binge eating?

8. If you checked ‘YES’ to any of these ways of avoiding gaining weight, were any as often, on average, as twice a week?

9. Do you ever drink alcohol (including beer or wine)?

IF YOU CHECKED “NO”, GO TO QUESTION #11.

10. Have any of the following happened to you more than once in the last 6 months?
a. You drank alcohol even though a doctor suggested that you stop drinking because of a problem with your health.

b. You drank alcohol, were high from alcohol, or hung over while you were working, going to school, or taking care of children or other responsibilities.

c. You missed work or were late for work, school, or other activities because you were drinking or hung over.

d. You had a problem getting along with other people while you were drinking.

e. You drove a car after having several drinks or after drinking too much.

11. If you checked off any problems on this questionnaire, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all  Somewhat difficult  Very difficult  Extremely difficult

12. In the last 4 weeks, how much have you been bothered by any of the following problems?

a. Worrying about your health.

b. Your weight or how you look.

c. Little or no sexual desire or pleasure during sex.

d. Difficulties with husband/wife, partner/lover or boyfriend/girlfriend.

e. The stress of taking care of children, parents, or other family members.

f. Stress at work, outside of the home, or at school.

g. Financial problems or worries.

h. Having no one to turn to when you have a problem.

i. Something bad that happened recently.

j. Thinking or dreaming about something terrible that happened to you in the past—like your house being destroyed, a severe accident, being hit or assaulted, or being forced to commit a sexual act.

13. In the last year, have you been hit, slapped, kicked, or otherwise physically hurt by someone, or has anyone forced you to have an unwanted sexual act?

No  Yes
14. What is the most stressful thing in your life right now?

15. Are you taking any medicine for anxiety, depression, or stress?

16. FOR WOMEN ONLY: Questions about menstruation, pregnancy and childbirth.
   a. Which best describes your menstrual periods?

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<tr>
<th>Periods are unchanged</th>
<th>No periods because pregnant or recently gave birth</th>
<th>Periods have become irregular or changed in frequency, duration or amount</th>
<th>No periods for at least a year</th>
<th>Having periods because taking hormone replacement (estrogen) therapy or oral contraceptive</th>
<th>NO</th>
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b. During the week before your period starts, do you have a serious problem with your mood—like depression, anxiety, irritability, anger or mood swings? .........................

c. If YES: Do these problems go away by the end of your period?

d. Have you given birth within the last 6 months?

e. Have you had a miscarriage within the last 6 months?

f. Are you having difficulty getting pregnant?
Appendix

Alcohol Use Questionnaire

Please answer the following questions as honestly and accurately as possible based on your drinking habits.

1. Have you drank alcohol (beer, wine, liquor) at least 12 times in your lifetime?
   - Yes
   - No

2. During the past 12 months, about how often did you usually drink alcohol?
   - Everyday
   - Nearly everyday
   - 3 to 4 days a week
   - 1 to 2 days a week
   - 2 to 3 days a month
   - Once a month
   - 7 to 11 days in the past year
   - 3 to 6 days in the past year
   - 2 days in the past year
   - One or less than one day in the past year

3. On the days when you drank during the past year, about how many drinks did you usually drink in a single day on WEEKDAYS? ________________

4. On the days when you drank during the past year, about how many drinks did you usually drink in a single day on WEEKENDS? ________________

5. During the past year, what was the largest number of drinks you had in one day on a WEEKDAY? ________________

6. During the past year, what was the largest number of drinks you had in one day on a WEEKEND? ________________

7. Now think back over the past 30 days. During the past month, how often did you drink alcohol?
   - Everyday
   - Nearly everyday
   - 3 to 4 days each week
   - 1 to 2 days each week
   - 2 to 3 days a month
   - Once or less than once during the past month
8. On the days when you drank during the past month, about how many drinks did you usually drink in a single day on **WEEKDAYS**? ________________

9. On the days when you drank during the past month, about how many drinks did you usually drink in a single day on **WEEKENDS**? ________________

10. During the past month, what was the largest number of drinks you had in one day on a **WEEKDAY**? ________________

11. During the past month, what was the largest number of drinks you had in a single day on a **WEEKEND**? ________________

12. When was the last time you had anything alcoholic to drink? (Please be specific--for example, today, yesterday, a week ago, a month ago, two months ago)
   ________________
Appendix

Pregnancy Assessment of Lifestyle

Please answer the questions below as accurately and honestly as possible.

Your date of birth: ______/_____/______
Mo. Day Yr.

Was this a planned pregnancy? □ Yes □ No

When did you first seriously think, “I may be pregnant” ______/_____/______
(If you are not sure, please give your best guess.) Mo. Day Yr.

When was the first day of your last menstrual period? ______/_____/______
(If you are not sure, please give your best guess.) Mo. Day Yr.

Marital Status: □ Single / Never Married
□ Married
□ Divorced/Separated
□ Widowed

Race/Ethnicity
□ African – American
□ White – American
□ Asian – American
□ Hispanic
□ Other (specify): ________________

Education
Last grade completed: ___________

Current Employment
□ Unemployed
□ Homemaker
□ Disability
□ Work Full Time (35 + hrs/week)
□ Work Part Time (<35 hrs/week)

Occupation: ________________

□ Student

At the present time, what is your religious preference?
□ Roman Catholic
□ Protestant (Baptist, Episcopal, Lutheran, Methodist, Presbyterian, etc.)
□ Jewish
□ Muslim
□ Buddhist
□ Other (specify): ________________
SECTION 1:
1a. Does your partner or significant other smoke? □ Yes □ No

1b. If yes, how many cigarettes a day does your partner/significant other smoke? ____________

1c. Have you ever smoked cigarettes in your lifetime? □ Yes □ No

If you answered “NO” to question 1c, SKIP TO SECTION 2. If you answered “YES” to question 1c, please answer question 2:

2. When did you last smoke a cigarette? (Please be specific, for example, today, 3 days ago, 2 months ago, 3 years ago) ____________

2b. How many cigarettes did you smoke the last time you smoked? ____________ cigarettes

If you have NOT smoked within the past 6 months, SKIP TO SECTION 2. If you have smoked within the past 6 months, please answer questions 3-12:

3. Have you ever smoked daily? □ Yes □ No

3a. If yes, at what age did you start smoking on a regular basis or at least once a day? ______ years old

3b. In your lifetime, when you were smoking at your heaviest (“the most”), how many cigarettes did you smoke each day? ____________ cigarettes

3c. During the past three months, how many cigarettes did you typically smoke each day? ____________

4. How many times in your life have you made a serious attempt to quit smoking? Circle the # that is correct for you:
   0 1 2 3 4 5 6 7 8 9 10 10
   +

5. Have you ever felt a need to cut down or control your smoking, but had difficulty doing so? □ Yes □ No

6. Do you ever get annoyed or angry with people who criticize your smoking or tell you that you ought to quit smoking? □ Yes □ No
7. Have you ever felt guilty about your smoking or about something you did while smoking? □ Yes □ No

8. How soon after you wake up do you smoke your first cigarette?

□ Within 5 minutes
□ 6-30 minutes
□ 31-60 minutes
□ After 60 minutes

9. Do you find it difficult to refrain from smoking in places where it is forbidden e.g., in church, at the library, in the cinema, etc.? □ Yes □ No

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

□ First one in the morning □ Any other

11. Do you smoke more frequently during the first hours after waking than during the rest of the day? □ Yes □ No

12. Do you smoke if you are so ill that you are in bed most of the day? □ Yes □ No

---

If you have NOT smoked within the past 7 days, SKIP TO SECTION 2. If you have smoked within the past 7 days, please answer questions 13-15:

13. Thinking back over the last 7 days, starting with yesterday, how many cigarettes did you smoke each day (write your answer in the box for each day). If there was any day in the last 7 days where you did not smoke, write a “0” in the box for that day.
14. Have you cut down on your smoking since you thought or found out that you were pregnant? □ Yes □ No

15. Please rate your desire to quit smoking on the following scale. Circle the # that is correct for you:

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<td>4</td>
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<td>Desire</td>
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SECTION 2:

16. Have you drunk alcohol (beer, wine or liquor) at least 10 times in your life? □ Yes □ No

If you answered "NO" to question 16, skip to SECTION 3. If you answered "YES", please answer questions a thru k:

a. Have you ever drunk at least 6 drinks in a single day (for example, 6 beers, 6 glasses of wine or 6 mixed drinks)? □ Yes □ No

b. How many drinks does it take before you begin to feel the first effects of alcohol? _________
c. How many drinks does it take to make you feel high?

d. How many drinks does it take before the alcohol makes you fall asleep or pass out? Or, if you never drink till you pass out, what is the largest number of drinks you have ever had?

e. Have close friends or relatives worried or complained about your drinking this past year? □ Yes □ No

f. Have you sometimes taken a drink in the morning when you first got up? □ Yes □ No

g. Have people annoyed you by criticizing your drinking? □ Yes □ No

h. Have you ever felt guilty about your drinking? □ Yes □ No

i. Has a friend or family member ever told you about things you said or did while you were drinking that you could not remember? □ Yes □ No

j. Have you ever felt the need to cut down on your drinking? □ Yes □ No

When did you last have anything alcoholic to drink (beer, wine, liquor)? (Please be specific) ________________________________

SECTION 3:

17. How old were you when you first used marijuana/weed? _______ yrs.

17a. When did you last use? (Please be specific) ________________

18. How old were you when you first used speed/crank/"uppers"? _______ yrs.

18a. When did you last use? (Please be specific) ________________

19. How old were you when you first used cocaine/crack? _______ yrs.

19a. When did you last use? (Please be specific) ________________

20. How old were you when you first used heroin/narcotics or non-prescribed pain killers, (e.g., codeine, percocet) _______ yrs.

20a. When did you last use? (Please be specific) ________________

If you answered “NO” to ALL questions 17 – 20, please SKIP TO SECTION 4. If you answered “YES” to any question in 17-20, please answer questions 21a thru e:
21a. Have you ever felt that you ought to cut down on your drug use? □ Yes □ No
21b. Have people ever annoyed you by criticizing your drug use? □ Yes □ No
21c. Have you ever felt bad or guilty about your drug use? □ Yes □ No
21d. Have you ever used the drug first thing in the morning to steady your nerves or to avoid withdrawal? □ Yes □ No
21e. Have you ever had problems due to drug use? (e.g., family, legal, financial) □ Yes □ No

SECTION 4:

22. Have you ever been treated by a mental health professional (for example, a psychiatrist, psychologist or social worker) or any other doctor for psychological problems? □ Yes □ No
22a. If yes, how long ago were you treated? __________________________
22b. What were you treated for? __________________________
22c. Please list any psychiatric medications you are currently taking? __________________________
Appendix

**TWEAK**

The TWEAK is a five-item scale developed to screen for risk drinking (Russell, 1994). TWEAK is an acronym for tolerance (hold), worried, eye-opener, amnesia, and (k) cut down. The five questions that make up TWEAK are as follows:

**Tolerance (HOLD):** “How many drinks can you hold (the number of drinks you can consume before passing out or falling asleep)?”

**Worry:** “Have close friends or relatives ever worried or complained about your drinking in the past year?”

**Eye-opener:** “Have you ever had a drink first thing in the morning to settle your nerves or to get rid of a hangover?”

**Amnesia:** “Has a friend or family member ever told you about things you said or did while you were drinking that you could not remember?”

**Cut Down:** “Have you ever felt you ought to cut down on your drinking?”

The first two questions (tolerance and worry) are given two points each if endorsed. For women, tolerance is endorsed if she can “hold” more than five drinks without passing out. The remaining questions are scored one point for each endorsement, giving a maximum score of seven. A score of two or greater indicates perinatal risk drinking.
Vita

Sarah Meshberg-Cohen was born on September 9, 1979, in Connecticut, and is an American Citizen. She graduated from Fairfield High School in Fairfield, Connecticut in 1998. She received her Bachelor of Arts in Psychology from Skidmore College in Saratoga Springs, New York in 2002. She began her graduate training in Clinical Psychology at Virginia Commonwealth University in Richmond, Virginia in 2004.