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Risk Factors for Intimate Partner Violence During Pregnancy

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RISK FACTORS FOR INTIMATE PARTER VIOLENCE DURING PREGNANCY

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ABSTRACT

Intimate partner violence (IPV) has been shown to be highly prevalent during pregnancy, particularly for couples of low socioeconomic status. IPV poses an especially serious problem for pregnant women as it puts both mother and unborn child at risk for severe physical harm, including death. This investigation of potential risk factors for IPV during pregnancy examines alcohol use, stress, suspicion of infidelity, jealousy, and relationship discord from both a cross-sectional and longitudinal perspective. The overarching theoretical frameork for this study is based on Leonard's conceptual model of substance use and intimate partner violence in combination with evolutionary theory as discussed by Buss & Duntley's evolved homicide theory and Harris' social-cognitive theory. A sample of 180 pregnant women was collected in order to investigate 1) the extent to which alcohol use, stress, infidelity, jealousy, and relationship dissatisfaction predict intimate partner violence in this sample, and 2) to evaluate the potential moderating effects of alcohol use on the relationships between jealousy and intimate partner violence and stress and intimate partner violence. Results indicate that alcohol use was a salient predictor of several types of IPV victimization and the combination of partner alcohol use, jealousy, and suspicion of infidelity most strongly predicted severe physical victimization during the first 18 weeks of pregnancy. Results also indicate that alcohol mediated the relationship between jealousy and psychological and severe

physical victimization. Implications for future research and clinical implications are discussed.

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Intimate partner violence (IPV) is highly prevalent in the United States and afflicts men and women of any age, ethnicity, socioeconomic status, and sexual orientation. It is estimated that at least 1.8 million women are assaulted in their homes yearly (Lee, Gottheil, Sterling, Weinstein, & Serota, 1997), and during the past two decades, IPV has become one of our nation's top health concerns (U.S. Department of Health and Human Services, 2000; Leonard, 2005). Schaefer, Caetano, and Clark (1998) found that over 20% of couples in the United States had experienced IPV in the past year. That prevalence has been found to increase to up to 30% in married or cohabiting couples (see Tjaden & Thonnes, 2000, for review). In fact, intimate partner violence offenses comprised 22% of all violent crime against women between 1993 and 1998 (U.S. Department of Justice, 2002). IPV, including psychological aggression, also has tremendous consequences in the form of physical and emotional health problems including spousal homicide, suicide, depression, posttraumatic stress disorder, substance abuse, miscarriage, sexually transmitted infection, gastrointestinal problems, and chronic pain (Coker, Smith, Bethea, King, & McKeown, 2000; Collins, Kroutil, Roland, & Moore-Gurrera, 1997). Additionally, most cross-sex homicides are committed in the context of a romantic relationship, with men far outnumbering women as the perpetrator and women far outnumbering men as the victims (Paulozzi, Saltzman, Thompson, & Holmgreen, 2001; Daly & Wilson, 1988, 1999; Dobash & Dobash, 1979).

Research has identified alarmingly high rates of IPV victimization in expectant women, with a prevalence of up to forty-four percent (for review see Taillieu &

Brownridge, 2010; Gazmararian, Lazorick, Spitz, Ballard, Saltzman, & Marks, 1996, and Bailey, 2010). Similarly, Burch and Gallup (2004) found that the frequency and severity of male-perpetrated IPV was twice as high when the female partner was pregnant and Koenig and colleagues (2006) found that 61% of their sample was abused by a relationship partner only during their pregnancy. Several studies also have found that women who had not previously experienced relationship violence report that the initiation of male-perpetrated IPV occurred during pregnancy or shortly after childbirth (Koenig et al, 2006; Edin, Holberg, Dahlgren, & Lalos, 2009; Jasinski & Kantor, 2001; Burch & Gallop, 2004; Gielen, O'Campo, Faden, Kass, & Xue, 1994). In fact, Vatnar and Bjorkly (2010) found that motherhood significantly increased women's risk of physical and sexual IPV victimization. Other research has shown that the frequency and severity of violence increases during pregnancy (Martin, Mackie, Kupper, Buescher, & Moracco, 2004; Campbell, Oliver, & Bullock, 1998; Adams-Hillard, 1985).

However, some of these findings have been derived from studies with significant methodological flaws. For example, the Burch and Gallop (2004) study utilized a sample of men from a batterer intervention group who may be more likely to be violent than the normal population and just 33 out of 258 men endorsed physical aggression towards a pregnant partner. With this study design, it is unknown how many of these men were in relationships with pregnant women and would have had the opportunity to aggress in this fashion. So, although findings from this study might hold true for a small subsample of men, it does not necessarily generalize to the larger population. Comparable methodological limitations exist in other studies as well. The majority of the literature on

this topic does not gather corroborating partner reports and, whereas the existing literature has suggested that IPV may increase during pregnancy, just three studies available to date have collected longitudinal data. Each of these three studies found that the prevalence of physical IPV during pregnancy is lower than the prevalence of IPV before or after pregnancy (Martin et al, 2001; Silverman, Decker, Reed, & Raj, 2006; Charles & Perreira, 2007). Sagrestano, Carroll, Rodriguez, and Nuwayhid (2004) also found that of the women who reported IPV in her sample, equal numbers of women reported initiation, cessation, and continuing IPV. However, Silverman et al (2006) also found that a very small subset of their study participants (2.6%) experienced IPV both prior to and during pregnancy. This study suggests that although overall prevalence may decline, there could exist a smaller group of women that indeed experience a spike in IPV during pregnancy.

Although the existing literature concurs that IPV against pregnant women occurs across demographic and SES factors and that violence in this population is a critical relational problem that demands further attention and intervention, the question of whether or not an initiation or increase in IPV occurs during pregnancy remains unanswered. The majority of the existing literature, including the aforementioned longitudinal studies, consists of studies conducted in the fields of nursing and public health. Therefore, these manuscripts have focused primarily on IPV around the time of pregnancy as a predictor of physical and mental health consequences as opposed to examining possible precipitants or risk factors for IPV as a negative outcome unto itself.

Despite the lack of clarity regarding the prevalence of IPV during pregnancy, the existing literature on this topic has established that violence perpetrated against pregnant women has an even more malignant impact compared to non-expectant women due to the threat posed to the unborn child (American College of Obstetricians and Gynecologists, 1995; Huth-Bocks, Levendosky, Theran, & Bogat, 2004). Pregnant women who are victims of IPV are at heightened risk for serious physical and psychological difficulties (Golding, 1999; Goldstein & Martin, 2004) such as complications during labor and delivery (Valdez-Santiago & Sanin-Aguirre, 1996), miscarriage or preterm labor (Morland et al, 2008; Sharps, Campbell, & Bullock, 2007), stress (Ellis et al., 2008; Altarac & Strobino, 2002; Cokkinides & Coker, 1998), depression (Brown, McDonald, & Krastev, 2008; Campbell, Poland, Waller, & Ager, 1992), Post-traumatic stress disorder (Morland et al, 2008; Rosen, Seng, Tolman, & Mallinger, 2007; Rodriguez et al, 2008), substance use (Flynn & Chermack, 2008; Cokkinides & Coker, 1998), anxiety (Campbell, Poland, Waller, & Ager, 1992), continued smoking (Goedhart et al, 2009; Bailey & Daugherty, 2007), cessation of breastfeeding (Kendall-Tackett, 2007; Silverman et al, 2006), and abortion (Williams & Brackley, 2009). In fact, IPV during and around the time of pregnancy is the leading cause of death for mothers in the United States (Cheng & Horon, 2010; Krulewich, 2001).

IPV also poses a serious threat to the unborn child, including low birth weight (Fried, Cabral, Amaro, & Aschengrau, 2008; Rosen et al., 2007; Campbell et al. 1998; Huth-Bocks et al. 2002), fetal loss or premature delivery (Latendresse, 2009; Janssen et al. 2003; Lipsky, Holt, Easterling, & Critchlow 2003), fetal fractures (Janssen et al. 2003),

increased risk for child abuse by either parent (Moore & Florsheim, 2008; Casanueva & Martin, 2007), and even death (Cokkinedes, Coker, Sanderson, Addy, & Bethea, 1999; Ahmed, Koenig, & Stephenson, 2006).

Although the negative effects of IPV during pregnancy are well-documented, few investigations have explored possible predictors of this relational problem. Thus, the present study aims to examine several possible contributing factors. The overarching theoretical basis for this study is derived from Leonard's conceptual model of substance use and IPV (Leonard, 1993; 2001; Leonard & Senchak, 1996). This model asserts that proximal and distal risk factors may exist, but it is only in a broader negative context where conflict is already taking place that their effects become salient. This study hypothesizes that alcohol use will be the immediate proximal precipitant to violence in this sample due to its disinhibiting effect on aggressive behaviors. However, consistent with Leonard's model, it is also hypothesized that there are several other factors that contribute to the conflictual context in which IPV occurs. In other words, this study is not only interested in examining what potential risk factors exist for IPV during this time, but also how these proximal and distal factors might combine to precipitate IPV victimization. Therefore, this study will be the first to examine stress, suspicion of infidelity, jealousy, and alcohol use as risk factors for experiencing IPV during pregnancy. As described below, each of these factors has been shown to contribute to IPV in non-expectant couples and is likely to be salient in this population as well.

Stress and Relational Distress

The concept of stress is tightly intertwined with each of the factors being investigated in this study, and it is proposed to be a major contributing factor to the formation of the negative context that Leonard asserts is central to the experience of IPV. Karney and Bradbury (1995) were amongst the first in a now very large literature to demonstrate how stressful life events, developmental transitions, and relationship satisfaction are mutually influential. Although some research has shown that the transition to parenthood can be a time of positivity and intimacy (Feeney, Hohaus, Noller, & Alexander, 2001) a host of other research has demonstrated a consistent decline in relationship adjustment during pregnancy and the transition to parenthood (Mitnick, Heyman, & Smith-Slep, 2009; Lawrence, Rothman, Cobb, Rothman, & Bradbury, 2008; Doss, Rhoades, Stanley, & Markman, 2009; Sagrestano et al., 2004). A review by Mitnick, Heyman, and Smith-Slep (2009) found that the slight declines in relationship satisfaction that occur for both partners in the year after childbirth grow to more moderate dissatisfaction in the second year after childbirth. In fact, Cowan and Cowan (2000) found that roughly a third of partners in their research had declines in satisfaction that placed them in clinical levels of relationship distress. These strains may be even more pronounced in couples that are unmarried or did not plan the pregnancy (Lawrence et al., 2008; Cox, Paley, Burchinal, & Payne, 1999). This literature suggests that the stress that relationship partners endure during the transition to parenthood is extremely common and very influential on a dyadic partnership.

Although the transition to parenthood is fraught with difficulty for many couples, most couples do not experience IPV during pregnancy. Several theorists have argued that

stressors outside the romantic relationship such as low socioeconomic status may contribute significantly to relationship discord (Neff & Karney, 2004; Bradbury & Fincham, 1991; Karney, McNulty, & Frye, 2001). Stressors related to finances, education, and social support not only have been found to impact the trajectory of general relationship distress during the transition to parenthood (Doss et al., 2009), but these factors appear to consistently impact the prevalence of IPV across samples, including during pregnancy (Curry, 2006). Whereas most couples may be able to cope with the distress that commonly arises during this time without using violence, those couples that face additional external stress factors may experience an increased likelihood of experiencing IPV. Several studies have demonstrated that among a variety of socioeconomic variables in ethnically diverse samples, household income and poverty have been the strongest predictors of probability of intimate partner violence (Kaslow & Thompson, 2008; Cunradi, Caetano, & Schafer, 2002; Cunradi, Caetano, Clark, & Schafer, 2000).

A review by Gazmararian and colleagues (1996) found a prevalence of partner violence ranging from .9% to 20.1% in pregnant women. Lower levels of violence were found in samples of women recruited from private medical practices with patients reporting income above $50,000 per year, while higher levels of violence were found in the women recruited from public health clinics with patients reporting income less than $20,000 per year. Collectively these findings have indicated that low socioeconomic status puts expectant women at an additional risk of being victimized by a male partner (Tolman & Rosen, 2001; Cokkinides & Coker, 1998). These findings are not only

relevant for maternal health reasons, but also for child health and adjustment outcomes. Recently, Owen, Thompson, and Kaslow (2006) demonstrated that maternal stress mediates the relationship between the occurrence of IPV and child adjustment. Therefore, pregnant women of low socioeconomic status can be considered to be a population at exceptional risk of experiencing IPV and the negative consequences of IPV possibly due to their increased experience of stressors. The present study is interested in examining if the variables being investigated contribute to the experience of IPV during pregnancy over and above the risk that is ordinarily posed by this trying transition.

Jealousy/Suspicion of Infidelity

This study also investigated the impact of jealousy and infidelity on IPV in pregnant women from an evolutionary perspective as discussed by Buss and Duntley's evolved homicide theory (1998) and Harris' social-cognitive theoretical perspective (2003). Evolved homicide theory, which was derived from evolutionary theory, suggests that under the circumstance of suspected sexual infidelity by the female partner, the male partner may be motivated to perpetrate violence against her in order to retain control over her reproductive activity, to avoid devoting time, energy, and resources to an offspring that is not his own, and to prevent a rival of the same sex to gain evolutionarily (Daly & Wilson, 1992). Whether the infidelity is real, suspected, or even just feared, men might use violence to dissuade their female partners from being unfaithful or from leaving the relationship. Goetz and Shackelford (2009) found that men's sexual coercion and rape of their monogamous intimate partners was significantly related to men's perceived infidelities on the part of the female partner. Research by David Buss and colleagues has

suggested that a woman's reproductive status (as signified by her age) is at the core of that risk for violence. Along these lines, Gelles (2002) found that pregnant women experienced higher levels of relationship violence victimization. However, when age was controlled for in that study, that finding became less pronounced.

Gangestead, Thornhill, and Garver (2002) also assert that men's genetic investment in their reproductive power with their female partners is so powerful that men may be motivated to "keep track" of their partners in order to ensure fidelity. Findings indicated that women's reports of the extent to which their partners were extra-attentive and more proprietary increased significantly during ovulation. Finally, Shackelford, Goetz, Buss, Euler and Hoier (2005) demonstrated that even positive mate retention strategies displayed by men, such as buying a partner flowers, for example, may be less altruistic than they may initially appear. Findings from this study found that some behaviors that appeared to be a demonstration of affection were, in fact, indicative of their desire to prevent competition from other potential mates. These behaviors were also significantly correlated with the extent to which men perpetrated violence against their female partners. This study suggests that seemingly innocent mate retention behaviors may have the same origins and motivations as harmful, violent behaviors. By the line of reasoning presented by evolved homicide theory, IPV perpetrated against expectant women can viewed additionally as an attack on the unborn child that may not be their biological offspring. Silverstein (2003) found that the severity of partner violence during pregnancy when compared to violence prior to pregnancy was significantly higher when the woman's partner was unsure that he was the biological father of the child.

On the other hand, Harris' social-cognitive theory (Harris, 2003) provides a different line of reasoning to explain the perpetration of violence against pregnant women. This theory asserts that jealousy occurs when the security of an intimate relationship is threatened, which can happen both through the perception of an adult rival, or through the perception that the partner is diverting her attention to the new child. Her meta-analysis of the literature on sexual jealousy, infidelity, and violence proposes an alternative to the existing theories of mate retention, sexual jealousy, and violence perpetrated against one's relationship partner. She suggests that an individual may experience the most intense feelings of jealousy only when something of great emotional importance is threatened, such as a romantic relationship with the pregnant partner (Salovey & Rodin, 1984; Salovey & Rothman, 1991). This is consistent with some existing research indicating that jealousy plays an important role in IPV (Foran & O'Leary, 2008; Holtzworth-Munroe & Anglin, 1991).

Harris asserts that Daly and Wilson's theory is flawed in that they fail to include the emotional experience of jealousy as the mechanism that causes proprietariness to result in violent behavior. This relational jealousy can account for the initiation of violence during pregnancy by viewing the pregnancy as a transition from dyad to triad. Since dyadic partnerships are typically a source of great fulfillment or importance to an individual (Turner, 1970; White & Mullen, 1989), the attention that is taken away from the male partner and now devoted to the unborn child may threaten a man's sense of importance in the dyadic partnership. This could spur feelings of jealousy towards the unborn child that can in turn lead to IPV perpetration against his partner. Consistent with this theory,

Feeney (1999) asserts that attachment security is crucial to relationship stability and the transition to parenthood may cause couples to feel uneasy about the security of their relationship, thus causing additional stress to either partner (Feeney, Alexander, Noller, & Hohaus, 2003; Rholes, Simpson, & Stevens, 1998).

It is unclear whether one of these theories provides a superior explanation of the negative context in which IPV occurs during pregnancy or if there is an additive effect at work. The present study based its examination of suspicion of infidelity and jealousy on the perspective that these two theories are complementary, together accounting for possible motivations for men to perpetrate violence against their pregnant partner. Thus, the present study examined whether any jealousy, including jealousy of an unborn child, that threatens the security of the romantic relationship can provide a context in which IPV is more likely to occur.

Alcohol Use

Research in non-expectant couples has consistently documented alcohol use in both perpetrator and victim as one of the most potent predictors and correlates of relationship violence (Cunradi, Caetano, Clark, and Schafer, 2000; Stuart et al., 2006; Field, Caetano, & Nelson, 2004; Schafer, Caetano, & Cunradi, 2004; O'Farrell & Murphy, 1995; Murphy & O'Farrell, 1994). Several theories have emerged in an attempt to better explain the relationship between alcohol use and intimate partner violence. While some studies have established a relationship between longer term alcohol problems

and IPV (Cunradi, Caetano, Clark, & Schafer, 2006; Leadley, Clark, & Caetano, 2000), another line of research has demonstrated a strong temporal link between alcohol consumption and physical aggression perpetration (Stuart, 2005). This link has served to elucidate the potential effects that alcohol has on cognitive and behavioral processes in order to better understand why IPV may be more likely to occur in the presence of acute alcohol consumption. Other studies have shown that in addition to the immediate effects of acute alcohol intoxication, IPV may be brought upon by the physical and cognitive results of heavy drinking episodes such as disinhibition, hangovers, withdrawal, and cognitive impairment (Fals-Stewart, 2003; Fals-Stewart, Golden, & Schumacher, 2003; Field, Caetano, & Nelson, 2004; Leonard & Senchak, 1996).

The literature examining the link between alcohol and IPV has yielded a great deal of theory and clinical implications, but just a few studies have documented men's substance use as being relevant to IPV during pregnancy (Muhajarine & D'Arcy, 1999; Amaro, Fried, Cabral, & Zuckerman, 1990). Each of these studies documented that partner drinking increased a woman's risk of being physically abused during pregnancy. In one study, women whose partners had a drinking problem were more than three times as likely to be abused than women whose partners did not have a drinking problem. In spite of these tremendous advances, few theories have emerged in order to synthesize that information in a thorough fashion. Leonard's conceptual model of substance abuse and IPV is one of the most comprehensive models of IPV proposed to date and integrates the existing theory and evidence available on this broad topic. This framework acknowledges and emphasizes the effects that substance use has on an individual's cognitive,

psychological, physiological, and contextual issues. Leonard's conceptual model proposes that proximal factors (situational circumstances such as immediate environment and the effects of acute intoxication on an individual's behavior) together with distal factors (e.g., stable individual and couple characteristics such as communication and relationship skills deficits, personality traits, relationship discord) precipitate physical aggression in the presence of certain negative contexts (such as low SES, financial problems, major moves, or a stressful pregnancy). This model is also consistent with past research indicating that relationship adjustment and conflict have mediating effects on the relationship between alcohol use and IPV (Murphy & O'Farrell, 1996).

The present study seeks to highlight the effects of alcohol use as the most critical precipitant to IPV victimization in pregnant women. The direct effects of alcohol intoxication, such as impaired cognitive processing and impulsivity, may facilitate the more primary evolutionary urges to perpetrate violent aggression against a pregnant partner, which would further strengthen associations between jealousy and IPV. Evolutionary theory broadly argues that the emotional experience of jealousy is an adaptive one, the purpose of which is to facilitate the promotion of one's genes through reproduction and maximize the potential for ensuring appropriate investment in one's offspring. The existing literature on evolutionary theory also suggests that the behavioral responses to these complex emotions, which are controversial and not always socially adaptive or acceptable, are functional in that they may occur in order to serve important biological or evolutionary functions. This theory also suggests that in spite of the much publicized negative consequences of family violence, social learning that teaches many

individuals to avoid interpersonal violence, and the improved cognitive capacity that humans have gained over time, the evolutionary importance of preserving one's genetic investments are so great, and the threat to that investment is so critical, that restraint and reason which individuals might be otherwise be capable of may not be accessible in the presence of such a threat. Harris' theory adds that the threat of a loss of an emotional investment has become, over time, just as critical as a genetic or evolutionary one and may elicit emotional and behavioral responses that are just as primitive.

Thus, this study proposed that under circumstances in which the male partner suspects that his partner has been unfaithful, strong feelings of jealousy are likely to ensue. But, for many people, these aggressive urges might be restrained. In the presence of alcohol problems, however, the likelihood that the coping mechanisms individuals often employ may not be accessible and thus, it was proposed that when inhibitions regarding jealousy, suspicion of infidelity, and aggression are lowered through alcohol use, these urges are more likely to explode into violence. It was expected that the disinhibiting effects of alcohol would also heighten the effects of stress on IPV. Therefore, it was expected that higher levels of alcohol problems would strengthen the relationships between jealousy, suspicion of infidelity, stress, and IPV.

Hypotheses

Although the amount of empirical evidence available regarding the predictors and correlates of IPV has grown in recent years, there remains a scarcity of research developing and testing multivariate models of IPV in pregnant women. Similarly, despite an emergent, but still minimal, body of literature on IPV in expectant women, none of the

previously mentioned models have been tested in expectant women to date. One of the major limitations of the existing research on this topic is the use of cross-sectional data only. The present study addressed that methodological issue by collecting data at two time points (during early pregnancy and six weeks post-birth) in order to monitor changes in the variables in question. In addition, this is the first study to integrate the findings of the literature on substance abuse and IPV with the evolutionary perspective presented by Buss and Duntley and Harris. This marriage of perspectives allowed for a more comprehensive view of the specific factors involved in the occurrence of intimate partner violence in pregnant women. Taking these factors into consideration, it was hypothesized that, controlling for relationship adjustment, 1) higher levels of men's alcohol use, men's jealousy, men's suspicion of infidelity, and stress, will predict greater IPV, 2) men's alcohol use will moderate the association between jealousy and IPV, 3) men's alcohol use will moderate the association between stress and IPV, 4) men's alcohol use will moderate the relationship between suspicion of infidelity and IPV, 5) a three-way interaction will emerge between men's alcohol use, stress, jealousy, predicting IPV, and 6) a three-way interaction will emerge between women's reports of overall level of stress, men's alcohol use, and men's suspicion of infidelity in predicting IPV.

Methods

Determination of Sample Size

A sample of 180 participants was selected to examine the predicted associations at an alpha level of .05, a power level of .80, a small-to medium effect size for each hypothesis, and an expected 20% attrition rate at follow-up. It was estimated that our

data would yield a small-to-medium effect size based on past research reported in literature on intimate partner violence and its predictors and correlates. This sample size was derived via techniques outlined in Cohen, Cohen, West, and Aiken (2003) and Aiken and West (1991).

Study Participants

The sample of 180 expectant women in their first trimester was recruited from health clinics in the greater Knoxville area including University Family Physicians and the residents' ob-gyn clinic at the University of Tennessee Medical Center. All study participants resided in East Tennessee, spoke and read English, were at least 18 years of age, and had contact with either their intimate relationship partner or their child's father at least one day per month. If a woman had no relationship partner and no contact with their child's father, she was considered ineligible for participation.

Sixty-eight percent of the sample, or 122 women completed follow-up assessments. Seventy-nine percent of the sample was Caucasian, 15% were African American, and the remaining 5.1% were Hispanic, Native American, Asian, or an ethnicity "other" than those offered as options on the Demographics Questionnaire. The average level of education attained by the women in this sample was 11.9 years. 79.5% of the sample had attained between 11 and 13 years of education. As expected, 87.2% of the sample reported a household income of less than $50,000 yearly while 6.7% (12 participants) reported an income of between $50,000 and $100,000. Just four participants in this sample reported an income of over $100,000 yearly. Consistent with the demographics of the geographic area from which this sample was recruited, 80.6% of the

sample characterized themselves as Christian. One participant reported that they subscribe to the Buddhist faith, and 11.7%, or 21 participants reported their religion as "other". 64.4% of participants reported that they were currently in a dating relationship, 23.3% reported that they were married, 4.4% reported that they were divorced, and 7.2% reported that they were not currently in a romantic relationship. There was a great deal of variability in participant reports of the duration of their relationships, ranging from one month to 21 years. However, the mean relationship length was 34.6 months, or just under three years. On average, women in this sample had a mean of 1.2 children already living in their household including biological offspring, stepchildren, or adopted children. Each of the measures utilized in this study can be found in Appendix A.

Measures

Demographics Questionnaire. This measure collected information including age, education, ethnicity, income, number of children, recruitment site, duration and status of relationship, and due date.

Relational Jealousy Questionnaire. This is a 10-item self-report measure used to assess the extent to which female participants feel their partners are resentful of the attention they devote to their unborn child as well as the extent to which the male partner feels excluded from that relationship. This measure utilized a 7-point likert scale for scoring. This measure was created for use in this investigation and did not yield strong enough psychometric results to be used. Although the Cronbach's alpha for the measure was over the standard acceptable level of .70 denoting strong intrascale reliability, this

measure did not correlate as expected with other measures in the investigation indicating that its validity was likely not adequate and, thus, it was not considered an acceptable measure for use in this study. Factor analysis revealed that the most face valid items were by far the weakest items in the scale, a feature that may prove important for future scale development.

The Alcohol Use Disorders Identification Test (AUDIT, AUDIT-P; Saunders, Aasland, Babor, De La Fuente, & Grant, 1993) is a 10-item self-report instrument used to screen for drinking problems. The AUDIT assesses 1) quantity and frequency of drinking, 2) indicators of physiological dependence, 3) negative psychological reactions and psychological dependence symptoms, and 4) alcohol related problems that the person has encountered. For example, item 5 on the AUDIT reads " How often during the past 6 months have you failed to do what was normally expected of you because of drinking?" and item 6 on the AUDIT reads, "How often during the past 6 months have you needed a drink first thing in the morning to get yourself going after a heavy drinking session". A modified version of the AUDIT, titled the AUDIT-P, has been utilized in some past investigations of IPV and substance use in order to include reports of partner drinking (Stuart, Moore, Kahler, & Ramsey, 2003; Stuart, Moore, Ramsey, & Kahler, 2003). Each of these measures was modified for the current study to examine a period of 6 months as opposed to the original 12-month time frame examined by the original measures. Both the AUDIT and AUDIT-P have high internal consistency with Cronbach's alphas of .93 and .91 for women's reports of partner drinking (Stuart, Meehan, Moore, Morean, Hellmuth, & Follansbee, 2006). In this sample, the Cronbach's alphas for the AUDIT and

AUDIT-P were .69 and .85, respectively. Each item is scored from 0-4, and total scores on the AUDIT range from 0-40 with higher scores being indicative of greater alcohol problem severity. Those who score an 8 or higher on the AUDIT are considered to be of clinical significance. Items and scoring on the AUDIT-P are identical to those on the AUDIT. This measure instead asks participants to report on the drinking behaviors their partners engage in. For example, item 2 on the AUDIT-P reads " how many drinks containing alcohol did your partner have on a typical day when he/she was drinking?". Adequate validity for the AUDIT was determined by testing the measure on a group of known alcohol-dependent and non-alcohol dependent individuals and the measure demonstrated strong ability to measure these behaviors and discriminate between hazardous and non-hazardous drinkers.

The Percieved Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983). The PSS is a self-report questionnaire used to assess global life stress. This measure also takes into account the importance of perception of how stressful life events are to the participant. This is a 14-item questionnaire that has been documented as psychometrically sound. The PSS achieved an average Cronbach's alpha score of .85 across the three separate samples it was validated on. Determining adequate validity for this measure was achieved via expected strong positive correlations with participant scores on measures of stressful life events, depression, physical symptoms, the utilization of health care services, and social anxiety. Each item is scored on a scale from 0 to 4. It contains seven "positive" items, including items 4, 5, 6, 7, 9, 10, and 13. For example, item 4 reads, "In the last month, how often have you dealt successfully with irritating life hassles?". These

seven positive items are reverse scored. Standard scoring is used for the seven "negative" items, including items 1, 2, 3, 8, 11, 12, and 14. For example, item 2 reads, "In the last month, how often have you felt that you were unable to control the important things in your life?". The PSS was used to assess the extent to which participants feel that their lives are overwhelming and unpredictable. This instrument is commonly used in pregnancy research including studies of low-income individuals (Sagrestano et al, 2004). In the sample collected by Sagrestano et al (2004), the PSS demonstrated high inter-item reliability with an alpha of .78. In the sample collected by this study, the Cronbach's alpha was comparable at .76.

Interpersonal Jealousy Scale (IJS; Mathes & Severa, 1981). The IJS is a 54-item self-report questionnaire designed to assess how jealous one is in various situations involving their partner. Each question is rated on a 9-point scale, ranging from 1 (absolutely true) to 9 (absolutely false). This version has been modified from its original 27-item version in order to assess both the participant's and partner's levels of interpersonal jealousy. Higher scores are indicative of higher levels of jealousy. This measure has been shown to have strong reliability for both men and women with a Cronbach's alpha of .92 for both genders. In this sample, the Cronbach's alpha was .93. Adequate validity for this measure was established by correlating scores on the IJS with scores on measures of romantic love, liking, insecurity, and self esteem. Hypothesized correlations were supported by their findings, indicating that the IJS had adequate construct validity.

Events With Others (EOS; Buss & Shackelford, 1997). The Events with Others is a 12-item self-report questionnaire in which the participant first estimates the likelihood

(on an 11-point scale ranging from 0% to 100%) of either themselves or their partner engaging in various types of infidelity in the upcoming year. These behaviors include flirting, kissing, having a one night stand, having a brief affair, and having an extended affair. T-tests from the original scale use indicate that no significant gender differences exist, meaning that neither husbands nor wives reported greater likelihood of extramarital activity. Additionally, no significant differences existed in cross-spouse data analyses, indicating that partners accurately estimated each others' likelihood of extramarital activity. However, results from the original scale validation indicated that spouses tended to underestimate the likelihood of their own and their partner's infidelity compared to reports from past literature (Glass & Wright, 1992). The scale was modified to address the particular question of interest for this study. Participants in this study were asked to rate 1) the likelihood that their partner might engage in extradyadic behaviors such as flirting, kissing, going on a date, having a one night stand, or having an affair with another woman and 2) how much their partners believed that they (the participant) would engage in the same behaviors with another man. The Cronbach's alpha for this scale in the present study was .76.

Dyadic Adjustment Scale (DAS; Spanier, 1976). The DAS is a 32-item self-report questionnaire that is widely used to measure relationship adjustment in romantic couples. In this investigation, only women's relationship adjustment was collected and examined. Women in this sample were not asked to report on their partner's relationship adjustment. This measure has demonstrated high levels of construct validity with correlations over .85 with other commonly used marital adjustment measures. Reliability estimates yielded

a Cronbach's alpha of .96 for the scale as a whole in the original scale validation. Content validity for this measure was established by ratings from independent judges. Adequate criterion validity was established by significantly differing scores on the DAS between married and divorced couples, and strong construct validity was established through correlations with other measures of marital satisfaction. The DAS yields a possible total score of 0-151. Higher scores on the DAS are indicative of higher levels of relationship adjustment, with scores below 97 considered to be clinical levels of relationship distress. In the present sample the DAS had a Cronbach's alpha of .84.

The Revised Conflict Tactics Scale (CTS-2) (Straus, Hamby, Boney-McCoy, & Sugarman, 1996). The CTS-2, based on the original Conflict Tactics Scale (CTS; Straus, 1979), is the most widely used scale for assessing partner violence (Straus et al., 1996). The 78-item CTS-2, which measures the behavior of both the respondent and the respondent's partner, contains five subscales: Negotiation (6 items), Psychological Aggression (8 items), Physical Assault (12 items), Sexual Coercion (7 items), and Injury (6 items). However, for the purposes of this investigation, only the psychological and minor and severe physical aggression subscales were utilized. The CTS-2 demonstrated strong discriminant and constuct validity as well as internal consistency with Cronbach's alphas of .86, .79, .86, .87, and .95 on each of the subscales, respectively. In this sample the Cronbach's alpha for the CTS-2 as a whole was .92. The CTS-2 also allows for operationalization of minor and severe forms of violence, which the original CTS did not. The CTS-2 is scored by summing the frequency of each of the behaviors in the past six months reported on each subscale; the score range for each item is 0-25, where 0 and

7=0, 1=1, 2=2, 3=4, 4=8, 5=15, and 6=25. At baseline, participants were asked to respond for the time period since they became pregnant. At follow-up participants responded for the time period since their baseline assessment took place.

Number of Days of Contact at Follow-Up. Once the research staff had collected contact information and given participants instructions for completing the surveys, participants were asked to report on the number of days in which they did not see their significant other for a full 24 hour period. This information was collected in order to more accurately assess the extent to which couples had the opportunity to be aggressive.

Recruitment and Assessment Procedures

Women were invited by a member of the research team to participate in a study of wellbeing during pregnancy at the University of Tennessee. Members of the primary care team including nurses and nurse practitioners assisted in recruitment. These primary care givers were in a position to know the patient's initial eligibility to participate in the study. The primary care giver briefly explained the nature of the study and asked, if the patient was interested, if a member of the research team could enter the exam room in order to explain further. Those who met eligibility criteria and were interested in participation were asked to read and sign the consent form after asking any questions she had. The patient was informed that should she decline to participate, she would not incur any penalty, her prenatal treatment will not be endangered, and her primary care team would not disapprove of her choice. She was also informed that she would be given twenty-five dollars for each of two assessments in the form of gift certificates to Wal-Mart and that

her participation may potentially benefit other pregnant women via her contribution to a scientific study. Participants were also informed that if they chose, the surveys could be administered over the phone at her convenience. Each participant was also given a comprehensive list of resources in the community to assist with a variety of stressful life issues. These resources included crisis hotlines, substance abuse treatment programs, parenting programs, psychiatric services, and women's shelters.

Participants were asked to report on their relationship status at the outset of the study in order to determine whom the participant would refer to on survey items throughout the study. Each participant was asked to report on the same significant other for both baseline and follow-up assessments. If a woman was not in a romantic relationship at the time of her baseline assessment, she was asked to refer to her child's father throughout the study. As a result of IRB restrictions, reminder contact with participants was prohibited between assessments. In order to schedule follow-up assessments, and in order to encourage women to attend their six week follow-up appointments at the clinic, research staff began contacting participants by phone two weeks after their reported due date. Research staff also had a running list of participants who were becoming due for follow-up assessments and the ob/gyn clinic's appointment lists were checked weekly for the names of these participants in the event that they had an upcoming appointment already scheduled. Follow- up assessments were conducted four weeks post birth at the earliest, and these assessments were conducted either in person at the participant's next clinic appointment or by phone. Participants remained eligible for follow-up assessments for the duration of the study.

Results

Preliminary Analyses

Because the current investigation, like many investigations of family violence, included outcome variables that often occur at low frequencies in community samples, examining the skewness and kurtosis of the aggression variables in this sample was integral in determining an appropriate data analytic strategy. Statistical standards state that skewness above the range of 1.0-2.0 is considered a violation of normality and, therefore, not suitable for traditional OLS regression analyses (Micceri, 1989; Maxwell & Delaney, 2004). Psychological victimization demonstrated the least skewness at 2.52. But the remaining outcome variables including minor and severe physical victimization had skewness of 4.56 and 10.04, respectively. While controversial, some IPV investigators have attempted to log transform non-normally distributed outcome data in an effort to ameliorate violations of statistical assumptions of normality (Atkins & Gallop, 2007). This method was attempted in this case, but was unsuccessful in bringing the data to a more acceptable range of skewness.

Upon recommendation from senior researchers and family violence statisticians, zero-inflated poisson and negative binomial regression were also attempted. Unfortunately, these attempts were also unsuccessful in all models except those using psychological aggression as the outcome variable. In spite of extensive consultation with senior statisticians such as Dr. Robert Gallop and Mr. David Schlotzhauer, a senior statistical consultant with SAS, it was determined that zero-inflated modeling was also not an accurate or acceptable method of analysis:

"There is no established way to proceed with such modeling issues. When you run into such model-fitting problems it is usually because the model has become too complex to be supported by the data and some parameters cannot be estimated. It is not necessarily caused by a particular predictor or a particular effect in the model. Usually these problems are resolved by experimentation with the model to find a model that can be estimated and which performs adequately for the intended purpose… Unfortunately, for a given data set it is possible that some models cannot be successfully estimated and that may be the case here. I'm afraid I do not have any other ideas to suggest beyond what I've mentioned." D.S. Schlotzhauer (personal communication, May 21, 2010).

In light of these failed attempts at alternate methods of analysis which would not violate traditional statistical assumptions, dichotomizing the IPV outcome variables and employing logistic regression was determined to be the next best analytical strategy. Although this method has been criticized for a variety of reasons (Atkins & Gallop, 2007), it also has strengths and provides this investigation with the necessary capacity to compare participants who experience violence during pregnancy with those who do not, which is congruent with the overarching conceptual basis of this investigation. Dichotomizing violence variables is a strategy that has traditionally been utilized for this and similar purposes by many violence researchers (Ehrensaft, Cohen, Brown, Smailes, Chen, & Johnson, 2003; Eckhardt, Holtzworth-Munroe, Norlander, Sibley, & Cahill, 2008; Babcock, Jacobson, Gottman, & Yerington, 2000; O'Campo, Geilen, Faden, Xue, Kass, & Wang, 1985; Holtzworth-Munroe , Stuart, & Hutchinson, 1997; Coker, Davis, Arias, Desai, Sanderson, Brandt, & Smith, 2002; Coker, Smith, McKeown, & King, 2000).

Missing Values Analysis

Missing values analyses indicated that for almost all items administered to participants, less than 1% of the data were missing. Further, Little's omnibus test (Little,

1988) yielded non-significant results, indicating that that these data were missing completely at random. Mean substitution was utilized to replace missing values.

Means and Standard Deviations of Independent Variables

Means and standard deviations for independent variables in this sample can be found in Table 1. Although this sample included low SES women, their reports of relationship adjustment, stress, and other independent variables were better than expected. Participants reported a mean relationship adjustment score of 117 at baseline and 113 at follow-up. Although a decline after childbirth was consistent with expectations, these high satisfaction scores are congruent with the community samples originally collected to validate the DAS. Women also reported mean stress scores of 22 and 20 at baseline and follow-up, which, again, are congruent with other community samples collected with this measure. Women reported that on average, their partners were drinking at moderate to high levels with mean AUDIT-P scores of 11 and 9 at baseline and follow-up. In all, 113 women reported that their partners had a score of 9 or greater on the AUDIT at baseline and 57 reported AUDIT-P scores of 9 or greater at follow up. Participants reported mean partner jealousy scores of 135 at baseline and 137 at follow-up out of a total possible 243, indicating moderate to high levels of jealousy. Finally, women reported that their partners had very low suspicion of infidelity at baseline with a mean score of 2, but this score rose over time to a mean of nearly 9 out of a possible 60 at follow-up.

Prevalence and Frequency of IPV at Baseline and Follow-Up

Prevalence and frequency of IPV derived from scores on the CTS-2 at baseline and follow-up can be found in Table 2. At baseline, 67.7% of participants reported at

least one incident of psychological victimization, and 71.4% of participants reported at least one incident of psychological aggression perpetration. 13.3% of women reported at least one incident of minor physical victimization and 20.5% of women reported at least one incident of minor physical aggression perpetration. 8.3% of participants reported at least one incident of severe physical victimization and an identical 8.3% of women reported at least one incident of severe physical aggression perpetration. The prevalence of psychological victimization in this sample was comparable to other samples of community women (Basile, Arias, Desai, & Thompson, 2004; Taft, O'Farrell, Torres, Panuzio, Monson, Murphy & Murphy, 2006; Follingstad et al, 1990). However, the rates of both types of physical aggression were lower than what is typically reported in non-expectant community samples, which have sometimes reported prevalence of physical aggression up to 50% (Capaldi & Crosby, 1997; Lawrence & Bradbury, 2001; Fincham, Bradbury, Arias, Byrne, & Karney, 2006).

First, it was expected that women would report an increase in IPV victimization from baseline to follow-up. Unexpectedly, participants as a whole reported fewer incidents of each type of IPV victimization and perpetration at follow-up, and for several types of IPV, these reductions were substantial. 36.6% of participants reported at least one instance of psychological victimization and 40.5% reported psychological perpetration. 7.2% reported at least one instance of minor physical victimization and 10.5% reported minor physical perpetration. Finally, 2.7% reported severe physical victimization and 5.0% reported severe physical perpetration. Although the overall prevalence of IPV seems to have reduced over time, some women still encountered an

increase in each type of IPV. At follow-up, twenty-seven women reported an increase in psychological victimization, 43 reported no change in psychological victimization, and 52 women reported a reduction in psychological victimization. Eight women reported an increase in minor physical victimization, 90 women reported no change, and 24 women reported a reduction in minor physical victimization. Finally, just 3 women reported an increase in severe physical victimization, 104 reported no change, and 15 women reported a reduction over time.

Correlational Analyses: Are alcohol use, stress, suspicion of infidelity, and jealousy related to IPV?

Correlations of independent and dependent variables between assessment periods can be found in Table 3. In order to obtain more accurate correlation values, victimization scores were not dichotomized for correlation analyses and instead, CTS-2 scores were used as continuous variables. All correlations presented are reported as Pearson's r. It was expected that men's alcohol use, men's jealousy, men's suspicion of infidelity, stress, and relationship adjustment would correlate with IPV victimization at baseline and follow-up. We also expected that IPV at baseline would be related to IPV at follow-up. Psychological victimization at baseline was significantly related to each type of victimization at follow-up as well as partner alcohol use, jealousy, and stress at follow-up. Minor physical victimization at baseline was related only to minor and severe physical aggression at follow-up, and severe physical victimization was related to severe physical victimization, partner alcohol use, and suspicion of infidelity at follow-up.

Correlations amongst independent and dependent variables within assessment period are reported in Table 4. At baseline, men's alcohol use and jealousy were

significantly related to each type of women's victimization. Men's suspicion of infidelity was related to minor and severe physical aggression and stress was related to psychological and minor physical victimization. As expected, relationship adjustment at baseline was significantly and negatively related to each of the three types of victimization as well as men's alcohol use, men's jealousy, men's suspicion of infidelity, and stress.

At follow-up, relationship adjustment was significantly negatively related to each of the three types of IPV victimization, partner alcohol use, and stress. Men's alcohol use at follow-up was related to minor and severe physical victimization. Men's jealousy, men's suspicion of infidelity, and stress at follow-up were related to psychological victimization only.

Main Effects at Baseline: Do alcohol use, stress, suspicion of infidelity, and jealousy predict IPV?

Results of main effects analyses at baseline can be found in Table 5. This investigation hypothesized that men's alcohol use, men's jealousy, men's suspicion of infidelity, stress, and relationship adjustment would predict women's IPV victimization experienced during the beginning of pregnancy. In order to answer this question, CTS-2 scores were dichotomized such that those participants who reported at least one instance of each type of aggression were coded as a "1" and those who reported no violence were coded a "0". Logistic regression was employed in order to determine the extent to which each of these variables accounted for variance in IPV victimization in an additive model.

When predicting psychological victimization, men's alcohol use, and men's jealousy were significantly predictive, even in the presence of women's relationship adjustment. However, men's jealousy was significant only at p=.06, which is slightly over the traditional cutoff for statistical significance. When predicting mild physical aggression victimization, men's jealousy was the only significant predictor of victimization, although the control variable relationship adjustment was also significant. The proposed model demonstrated the strongest predictive ability with severe physical aggression as the outcome variable. In this model, men's alcohol use, men's jealousy, and men's suspicion of infidelity were all significant predictors of victimization, even in the presence of relationship adjustment (which was, again, predictive but slightly over the traditional significance cutoff).

Main Effects at Follow-Up: Do Alcohol Use, Stress, Suspicion of Infidelity, and Jealousy predict a change in IPV over time?

Logistic regression was then used to test the hypothesis that men's alcohol use, stress, suspicion of infidelity, and jealousy would significantly predict change in IPV victimization from baseline to follow-up. First, IPV victimization at follow-up was used as the dependent variable. Then, IPV victimization at baseline was entered into a simultaneous model that also included relationship adjustment as a control variable and each of the independent variables. Results of this analysis can be found in Table 5.

The predictive capacity of the hypothesized model was much more complex at follow-up. When predicting a change in psychological victimization, baseline psychological victimization was the strongest predictor although men's jealousy at

baseline was predictive at the p<.10 level. Relationship adjustment was the only variable that contributed to predicting a change in mild physical victimization but once again, it was significant only at the p<.10 level. Finally, severe physical victimization at baseline along with men's alcohol use (slightly over the traditional significance cutoff) significantly predicted severe physical victimization at follow-up.

Interactive Effects at Baseline and Follow-Up: Does Partner Alcohol Use interact with Stress, Jealousy, or Suspicion of Infidelity to Predict IPV?

Several moderating relationships were also hypothesized in this investigation. First, it was expected that at baseline, men's alcohol use would strengthen the association between men's jealousy and IPV. Second, it was also hypothesized that at baseline, men's alcohol use will moderate the association between stress and IPV. Finally, two three way interactions were proposed. It was expected that a three way interaction would emerge 1) between alcohol use, stress, jealousy, and IPV victimization and 2) between alcohol use, stress, men's suspicion of infidelity, and IPV victimization. Consistent with the techniques outlined in Cohen, Cohen, West, and Aiken (2003) and Aiken and West (1991), logistic regression analyses with main effects and interaction terms were employed to conduct these analyses.

At baseline, none of the hypothesized 2-way interactions yielded significant results. Similarly, none of the proposed 3 way interactions yielded significant results. Because none of the variables under investigation in this study significantly predicted a change in IPV victimization at follow-up, moderation analyses were not tested to predict IPV change.

Post-hoc Analyses

Is Mediation a Better Fit?

When considering possible reasons for the lack of interactive effects found in this investigation, the possibility that mediation may better suit the conceptual basis for this investigation was explored. While most people experience jealousy or insecurity in their relationships from time to time, not everyone who experiences those negative contexts behave aggressively towards their partners. Therefore, alcohol was hypothesized to provide the disinhibiting effects that prevent a person who is experiencing jealousy or suspicion of infidelity from better controlling their behavior. As a result, those who are jealous may be much more likely to use alcohol in an attempt to regulate this unpleasant emotion (e.g., Foran & O'Leary, 2008; Cooper, Frone, Russell, & Mudar, 1995; Mullen & Martin, 1994) and consequently, they would be much more likely to behave violently. Interestingly, Foran and O'Leary differentiated jealousy from anger and found that when combined with alcohol use, jealousy played a much stronger role in accounting for severe physical aggression than did anger. Along those same lines of reasoning, it was hypothesized that alcohol would mediate the relationship between suspicion of infidelity and severe physical victimization only. Because stress was not predictive of IPV victimization in the main effects analyses, alcohol was not hypothesized to mediate the relationship between stress and IPV and this analysis was not tested.

Mediation analyses were conducted consistent with the procedure outlined by McKinnon, Fritz, Williams, and Lockwood (2007) and McKinnon, Lockwood, Hoffman, West, and Sheets (2002). This procedure utilizes asymmetric confidence intervals in

order to test for mediation. McKinnon et al (2007) et al also demonstrated that this method yields less than 5% bias in estimating each of the three paths of the model (and, therefore, the size of the mediating effect) as well as the least likelihood of Type 1 error when compared to other common methods such as McKinnon's Z prime method (McKinnon et al, 2007). In all, three regression analyses are conducted in order to compute asymmetric confidence intervals using McKinnon's PRODCLIN computer program (McKinnon et al, 2007). For the purposes of illustrating the process, the example of men's alcohol use mediating the relationship between jealousy and severe physical victimization will be used. First, linear regression was used to determine if men's jealousy predicted men's alcohol use controlling for relationship adjustment (Path A; β=.07, SE=.03, p=.01). Second, logistic regression was utilized in order to examine the effect of men's jealousy on women's severe physical victimization controlling for relationship adjustment (Path C; β=.02, SE=.01, p=.05). Finally, logistic regression was used to examine the effect of men's alcohol use on women's severe physical victimization controlling for both relationship adjustment and jealousy (Path B; β=.04, SE=.02, p=.04). The final step in determining mediation occurs by multiplying the betas for paths A and B together in order to obtain an estimate of the mediated effect, β=.003, and a computed 95% confidence interval (.0001, .007). Since this confidence interval does not contain zero, and the estimated mediating effect falls within the confidence interval, the conclusion can be made that the mediating effect is significant. Additionally, the independent variable of jealousy becomes non-significant in the final regression step (Path B), further suggesting a full mediation. In the case of partial mediation, jealousy

would remain significant even when men's alcohol is also being controlled for, as can be seen in the effects on psychological aggression.

Consistent with expectations, men's alcohol use fully mediated the relationship between jealousy and women's severe physical victimization as seen in the illustration above. Men's alcohol use also partially mediated the relationship between men's jealousy and psychological victimization (β.004, 95% CI[.0007, .010]). Results of mediation analyses can be found in Table 7. Men's alcohol use did not mediate the relationship between men's suspicion of infidelity and severe physical victimization. Since stress did not significantly predict any type of IPV victimization, the mediating effect of alcohol on the relationship between stress and IPV was not examined.

Comparing Participants Who Experienced a Change in IPV Victimization with Those Who Did Not

In order to better understand the differences in baseline and follow-up main effects, main effects analyses were re-run with a new operationalization of change in IPV victimization over time. In this secondary analysis, a change score was computed by subtracting participants' follow-up CTS-2 scores from participants' CTS-2 scores at baseline. These scores were then dichotomized in order to create two groups. Those participants who experienced an increase in IPV victimization over time were coded as a "1" and those who experienced no change or a decrease in IPV victimization over time were coded as a "0". At follow-up, 71 of 122 participants reported a reduction or no change in psychological victimization while 51 participants reported an increase in this type of aggression, Ninety eight participants reported a reduction or no change in minor

physical victimization while 24 reported an increase, and 107 participants reported a decrease or no change in severe physical victimization while just 15 reported an increase. Reanalyzing the data in this way yielded no more significant results than using the first operationalization of change over time. In fact, none of the independent variables being investigated in this study were significantly predictive of change over time in this secondary analysis.

Comparing Participants Who Completed Follow-Up Assessments with Those Who Did Not

Given the transient nature of this sample and relatively low retention rates in this study, the question of examining differences amongst those participants who completed follow-up assessments and those who did not arose. Considering the overall reduction in the prevalence of IPV victimization from baseline to follow-up, it is possible that the reason for a lack of significant results predicting IPV change is that the participants who were less high functioning and possibly also experiencing higher levels of IPV were more likely to drop out compared to their higher functioning counterparts. This phenomenon is known to happen frequently in longitudinal studies (Hamer & Simpson, 2009).

Therefore, the next step in understanding the lack of significant results at follow-up was to compare groups of participants based on their completion of follow-up assessments. T-tests were conducted in order to compare several demographics, IPV victimization at baseline, stress, and alcohol use between those who completed follow-up assessments and those who did not. These results can be found in Table 8. Surprisingly,

the only variable on which means between groups differed is in relationship length, where those who completed follow-up had a mean relationship length of 40 months and those who did not complete follow-up had a mean relationship length of 24 months. However, the difference in mean psychological victimization only slightly missed traditional statistical significance cutoffs ($F=3.50$, $p=.06$). Because differences emerged on relationship length, and this variable may indicate a difference in relationship stability between groups, main effects predicting change in IPV victimization over time were re-run using relationship length as a control variable. Unfortunately, these results did not contribute much towards better understanding already complex findings. Relationship length, men's jealousy and relationship adjustment (this variable at $p<.10$) significantly predicted a change in psychological victimization. Relationship adjustment (again at $p<.10$) was the only variable that predicted minor physical victimization change, and men's alcohol use and baseline victimization predicted severe physical victimization, but both of these effects were only significant above traditional significance cutoffs with p-values less than .10.

Finally, in an attempt to use every available tool to attempt to understand these complex and unexpected follow-up results, amount of face to face contact with one's significant other emerged as a possible contributing factor. This factor was included in this analysis in order to control for how much opportunity partners had to be aggressive towards the participants in this study. While this is the most complex model presented in this study, it is also the most conservative and therefore provided the least likelihood of drawing incorrect conclusions from these results. In order to include this variable, the

number of days where no face to face contact took place (meaning for a full 24 hour period) reported at follow-up was then included as an additional control variable in the main effect analyses. Eighty-four out of the 122 women at follow-up reported 0 no contact days, indicating that most women in the follow-up sample remained very connected to their partner or child's father throughout the study. However, 84 women is less than half of the total study sample. The remaining 38 women reported great variability in their number of no contact days.

Although results from this analysis were not markedly different from the original follow-up analysis, some new relationships emerged and other relationships were strengthened. When predicting psychological aggression, number of no contact days, relationship adjustment, relationship length, men's jealousy, and baseline victimization are all statistically significant predictors and the effects emerged in the expected directions. For minor physical victimization, relationship adjustment was the only significant predictor, although baseline victimization and men's suspicion of infidelity emerged slightly over traditional statistical significance cutoffs at p=.08 for either variable. Whereas men's alcohol use and baseline victimization were significant predictors in the original follow-up analyses, none of the variables in this model were significant predictors of change in severe physical victimization. Results from this analysis can be found in Table 9.

The variables investigated in this study could not adequately explain the change in IPV from baseline to follow-up. These lack of findings, from the most liberal to the most conservative analyses, suggest that these data neither allow for conclusions about how

these variables influence IPV victimization at follow-up, nor do they allow for a complete rejection of the hypothesized conceptual model.

Discussion

Overview and Interpretation of Baseline Results

The aim of this investigation was to examine the extent to which men's alcohol use, men's jealousy, men's suspicion of infidelity, stress, and relationship adjustment might predict women's IPV victimization during pregnancy and shortly after childbirth. Results at baseline fit the proposed conceptual model of this study well. First, these findings indicate that consistent with past literature (see Bailey, 2010, for review), pregnant women frequently experience both psychological and physical aggression in their romantic partnerships.

Second, men's alcohol use, men's jealousy, men's suspicion of infidelity, and stress were established as correlates of IPV during the beginning of pregnancy in this sample. Regression analyses further explained how these variables predict IPV. While the model tested in this study is an additive model, which deviates somewhat from the more statistically complex conceptual model that Leonard proposed, these findings remain congruent with that concept. It appears that the evolutionary basis of this study gained some initial support from this data in that men's jealousy and suspicion of infidelity emerged as predictors of some types of IPV even in the presence of already established predictors such as stress. Although the amount of variance in IPV accounted for by the hypothesized model in baseline portion of the study is small and suggest that there are

other factors contributing to the experience of IPV in addition to the variables presented here, the relationships that emerged amongst those variables helps to clarify how these factors culminate in violent events. The mediating relationships that emerged at baseline suggest that jealousy is not only a predictor of IPV early in pregnancy in this sample, but also that jealousy might lead to alcohol use which in turn might lead to aggressive behavior. This finding is congruent with both evolutionary theory and Leonard's conceptual model in that it highlights the variables that both of these theories stress as predictors of IPV. Further, it also indicates a potential causal relationship between these factors. These mediating effects at baseline also are relevant because aggressive behavior at baseline was related to continued aggression at follow-up. If alcohol use can be consistently identified as a proximal precipitant to IPV in this population, this may point to an additional point of intervention not only to ameliorate IPV early in pregnancy, but perhaps also to prevent IPV from occurring between parents around the time of childbirth.

One of the more interesting findings derived from this part of the study was how differently the hypothesized model explained severe physical aggression compared to less drastic forms of IPV. Over the past two decades IPV theorists and researchers have begun to delineate between minor and severe IPV and the reasons behind perpetrating each type of aggression (Johnson, 1995; Holtzworth-Munroe & Stuart, 1994; Margolin, John, & Gleberman, 1988). A similar distinction may have emerged in this investigation. Perhaps, similar to the Burch and Gallop (2004) finding that even amongst a clinical batterer sample only a small minority perpetrated physical aggression against a pregnant partner,

there exists a smaller subset of couples who are more prone to this type of aggression under these particular circumstances and the variables investigated here explain, at least in part, the characteristics that predispose these couples to severe aggression. However, there may also be other personality characteristics not investigated by this study such as neuroticism, narcissism, borderline or antisocial pathology that play an important role in this type of aggression. Past research has implicated these factors as being precipitants to IPV in other populations and, when the conceptual basis of this study is reconsidered, it seems plausible that they could also play a contributing role during pregnancy because individuals with these types of character structure might be particularly sensitive to threats to relational investments and these particular results suggest that jealousy, suspicion of infidelity, and alcohol use are particularly relevant to severe aggression. It is possible that when these types of personalities experience a dire need to protect genetic and attachment investments in the face of a perceived threat to these investments they become more likely to perpetrate severe, purposeful acts of aggression as opposed to more common or impulsive acts of aggression.

Alcohol use has been established as a strong predictor of IPV in many other community and clinical populations, yet it is still an understudied variable in the literature on this population. The findings regarding men's alcohol use in this study add to that emerging literature and might indicate an additional point of assessment for health care providers. Establishing partner alcohol use as a risk factor for IPV during pregnancy and its many negative consequences may help health care providers determine the extent to which intervention might be necessary for expectant women and couples. This finding

also might indicate a point of intervention, even if only in the form of raising awareness amongst expecting couples that mens' characteristics could be very important to the health and wellbeing of their family. Presently, the prevention or reduction of substance use is not included as an element of most parenting interventions (see Pinquart & Teubert, 2010, for review) in spite of research indicating the critical changes that occur around the time of pregnancy and childbirth, including many known correlates of alcohol use such as poor overall functioning in the family of origin, divorce, negative relationship communication, poor conflict resolution, and stress (see Doss et al., 2009 for review). The findings from the present study point to alcohol use being a factor to consider adding to these interventions.

The baseline portion of this study also generated some surprising findings. It was expected that stress would play a more prominent role in predicting IPV in this sample. Not only was it surprising that a sample collected from a low SES population of pregnant women were experiencing about the same amount of stress as average, non-expectant, community women, but that that stress did not increase much during the transition to parenthood. Having used a reliable, valid measurement tool for this construct, measurement issues do not appear to be a likely reason for this outcome. It appears that this sample was surprisingly high functioning on other constructs in this study and, unfortunately, other factors such as social support were not investigated to better understand the factors that may have mitigated stress for these women.

Overview and Interpretation of Follow-Up Results

The findings from the follow-up portion of the study were much more complex and surprising. The most conservative follow-up analyses found that the hypothesized model as a whole was not predictive of any type of change in IPV, but parts of the model, such as jealousy and suspicion of infidelity emerged as potentially salient predictors of psychological and minor physical IPV. This model was particularly conservative in that the full global measure of relationship adjustment was used as opposed to using a relationship satisfaction subscale. In light of how well the proposed model predicted severe physical aggression early in pregnancy, it was very surprising that none of these factors emerged as predictors in that model at follow-up. Considering that just three women in the follow-up sample reported an increase in severe physical victimization over time, it is possible that those effects might have emerged if the study had achieved a lower attrition rate and had greater statistical power at follow-up. This study cannot eliminate the possibility that these variables remain important over time, but these analyses simply were not able to capture that pattern because of the potential loss of participants for whom these variables were significant contributing factors. This concern also is highlighted by the contrast between the initial follow-up analyses and the more conservative post hoc follow-up analyses. In the initial model, which was identical to the model tested at baseline, alcohol also emerged as a predictor of severe physical aggression. It is possible that this finding was also lost at follow-up as a result of high attrition rates and the characteristics of the sample that was retained.

Findings from the follow-up portion of study also highlight psychological aggression as a correlate of continued physical abuse in this population. In spite of the

fact that correlations and main effects between independent and dependent variables were more complex at follow-up, psychological victimization was the most consistent correlate of each type of victimization at both baseline and follow-up. This finding is consistent with earlier IPV literature documenting the stability of IPV as well as the fact that physical aggression rarely occurs in the absence of psychological aggression (Murphy & O'Leary, 1989; Coker et al., 2002; Cascardi & Vivian, 1995). Some of these correlations are modest, but these results suggest that those women who experienced any kind of aggression at baseline were also more likely to experience it, or a more severe form of victimization, at follow-up. Apart from any type of physical aggression, psychological victimization has severe negative physical and mental health implications for women unto itself including depression, PTSD, substance use, stress, and gastrointestinal problems (Nixon, Resick, & Nishith, 2004; Basile, Arias, Desai, & Thompson, 2004; Coker, Smith, Bethea, King, & McKeown, 2000). This finding emphasizes the already established urgency of screening for every type of IPV in prenatal care settings (McFarlane, Soeken, & Wiist, 2008).

Limitations

Several limitations impaired this investigation. The high attrition rate in this study was the most critical and severely limited the statistical power available for follow-up analyses. The loss of so many participants combined with unknown reasons for that attrition, made it difficult to fully interpret these findings which leaves remaining questions about whether IPV truly does initiate or increase during pregnancy and, if so, for whom and why? Although there were few differences at baseline between the women

who completed follow-ups and those who did not, there is no way to determine how these women might have differed following the baseline assessment and how those unknown factors may have influenced their responses at follow-up had they been willing or able to complete the study. There remains a possibility that although they were similar at the outset of the study on our measured variables, these women may have been on different trajectories, which, unfortunately, this study cannot examine any more closely. Furthermore, they might have been dissimilar on other relevant variables that we did not measure. For example, it is possible that lower follow-up rates are a result of less conscientious, lower functioning personality types dropping out at higher rates than their more conscientious, higher functioning counterparts. It is also possible that these personality factors may serve as moderating variables that better explain for whom these variables are precipitants to IPV. This additional factor may also account for the overall reduction in IPV prevalence and the very low numbers of women in the follow-up sample who reported increases in IPV over time. Unfortunately, without the full statistical power and data from the full sample, it is impossible to either draw or rule out conclusions about the proposed model at follow-up.

There were also some critical limitations regarding measurement. The Relational Jealousy Scale, designed to assess women's perceptions of their partner's jealousy of their new child (e.g. the threat to romantic partnership men were perceived to feel as a result of this pregnancy), was not constructed well enough to successfully measure of the concept that Harris' social-cognitive theory pointed out. Scale analyses revealed that many participants were reluctant to answer some of the more face valid items and as a

result of the failure of this measure a central concept was excluded from the analyses. The reasons for this pattern of reporting are unknown. It is possible that women were reluctant to paint their partners in a negative light, or perhaps this topic was sensitive enough to cause participants to feel uncomfortable answering. Additionally, it is also possible that women in this sample did not feel that they had enough knowledge of their partners' feelings to report accurately. With more time and improved financial resources, this measure may have been piloted prior to beginning the investigation. In the future, developing a more sound measure of this concept may help to clarify how relational jealousy and interpersonal jealousy are related to one another and to IPV.

The absence of corroborating partner reports is a significant weakness of this investigation. Without this data, it is impossible to corroborate women's reports of their partners' drinking behavior. This investigation also asked women to evaluate the extent to which they think their partners feel jealous or suspect infidelity. These are sensitive topics that may be prone to underreporting and, without gathering this information directly from the woman's partner, we cannot conclude how well our participants estimate their partners' experiences. Unfortunately, limitations in resources and strict IRB protocols did not allow for such data to be collected in this study, but in light of the findings presented here, future research should aim to include partner reports when possible. We were also limited to assessing just one primary partner or the participants' child's father. In spite of the fact that even dating participants had average relationship length of two years, other participants disclosed that they had more complicated dating histories and under those circumstances, we could not gather CTS-2 or other dyadic

behavior information from other significant others. In one case, a participant identified herself as being bisexual, had recently ended a relationship with her female partner in order to begin her relationship with her child's father and current partner who was assessed during the study. This is an example of a situation in which a participant may still be at risk for experiencing IPV victimization from a recent past partner and we were not able to assess other experiences of aggression. Not only was this study limited in this way, but future research might consider expanding data collection to include recent past partners or other significant others in order to more thoroughly understand who is perpetrating violence under what circumstances.

An additional time point near the end of pregnancy would have been extremely useful in order to better understand how IPV and other variables in question changed prior to the birth of the child so that it could be compared with a postpartum assessment. Without a baseline that began prior to women's prenatal care, it is difficult to determine the nature of these women's relationships prior to pregnancy, including the extent to which various types of aggression were being experienced. An alternative study design that could provide a more comprehensive understanding of these risk factors would be to examine newlywed couples prospectively.

Another limitation of this investigation is the limited monetary resources available to run this study. In spite of the fact that we were able to offer some monetary compensation for participation, the exceptional cooperation of the ob/gyn health care providers with whom we worked, a conscientious and hard working research team, and extensive contact data collected at baseline, some women were simply impossible to

contact post-partum. With greater resources and fewer IRB restrictions, it may have been possible to externally verify participants' original contact information or to contact participants more regularly in order to keep contact information up to date. This became especially problematic because many participants were using temporary cellular phone numbers through services like Cricket, which changed frequently. This investigation was also very limited by the IRB in terms of the time demands we were allowed to place on participants. Greater resources might have also afforded this investigation the ability to have a cell phone designated for the use of contacting participants and conducting follow-up assessments via phone. Although the research staff diligently made repeated attempts to contact participants, some participants did not answer phone calls from blocked cell phone numbers (which was required in order to protect the safety and privacy of research assistants) and even from the university-based phone number of the study office.

Directions for Future Research

Each of the previously discussed limitations suggest methods for improving future investigations of IPV during pregnancy, but several other questions and future directions for research also arose. Although the model presented in this investigation accounted for some variance in IPV victimization and provided some limited understanding of the topic in question, it is also evident that the combination of theories employed here did not completely account for IPV in this population. Whereas measurement issues certainly limited how well these theories were tested, it appears that the story told by the variables in this study remains an incomplete one. In light of the findings that suggest that character pathology or other personality traits may be relevant variables, it would also be

important to assess for both partners infidelities and whether or not those infidelities were disclosed. These additional variables may help delineate between character pathology that lends itself to being extra sensitive to relational threats (e.g. borderline or narcissistic traits) and a more objective experience of a genuine threat (e.g. having a partner be unfaithful and knowing about it).

Along the lines of improved measurement, if an adequate measurement tool for relational jealousy existed, it is possible that couples who already have children with their current partner would be less prone to this factor as a predictor of IPV. Most women in this sample had other children already, although we did not differentiate if those children were biological, step, or adopted children. This variable was not controlled in the analyses but it is possible that the conceptual framework presented here might better apply to first time pregnancies.

Also along the lines of measurement, future research would benefit from the inclusion of a measure of paternity certitude, or the extent to which a man believes the child is his biological offspring. Because just one significant other was reported on in this study, the experiences and behaviors of biological versus non- biological fathers cannot be compared. In order to more thoroughly understand the extent to which evolutionary theory contributes to IPV in this sample, adapting and including a measure of paternity certitude such as that of Fox and Bruce (2001) would be helpful.

This investigation did not examine change in jealousy or suspicion of infidelity over time. Since this study has established jealousy and suspicion of infidelity as relevant predictors of IPV for some pregnant women, advancing this line of understanding may

help us better understand victimization in this population. In addition to assessing and controlling for infidelities and their disclosure, future research would benefit from an analysis of how jealousy and suspicion of infidelity changed over the course of the pregnancy and the extent to which those changes might predict the occurrence of IPV. This study provided a small stepping stone to utilizing more advanced statistical methods such as structural equation modeling in order to more thoroughly understanding how various factors are related to one another and how they, together, contribute to IPV.

It might also be useful to compare IPV amongst heterosexual parents who conceive naturally to couples who choose alternative methods of conception, or those who adopt. This type of study may help to delineate between the effects of having a genetic investment and having strictly attachment investments and to operationalize a critical, but frequently abstract, element of this line of research that previously abstract concept. For example, if a couple adopts a child, neither parent has a genetic investment in that child, which eliminates the possibility that a member of the dyad might be threatened by genetic competition whereas, if a couple has a child by a surrogate parent because one parent is unable to conceive or carry a child, jealousy or relationship insecurity may be exacerbated. Research has demonstrated that IPV is not limited to any demographic group, including sexual preference (Alexander, 2002; Owen & Burke, 2004) so it is reasonable to anticipate that rates of IPV could be comparable across this demographic.

Finally, the topic of women's perpetration during pregnancy is one that was previously unexplored and the gender symmetry in prevalence of perpetration found in

this investigation was previously undocumented. It is unknown if women in this population were involved in mutually aggressive relationships, if women initiated aggression, or if women's aggressive behavior was in self-defense. Unfortunately, this study was not initially designed to explore predictors of women's aggression but this information, in addition to the importance of men's variables, points to a new direction for research to explore. However, in light of recent findings (Gordon et al, in prep), it is possible that this framework may also apply to women's perpetration. Findings in this area may help researchers and health care providers to better understand who experiences IPV in this population and under what circumstances. Additionally, it raises the question for researchers and clinicians of whether IPV in this population is predominantly a dyadic issue or if it is one that is characterized by more traditional theories of patriarchal terrorism (Johnson, 1995). More research in this area could provide a better understanding of the predictors of women's aggressive behaviors and also may help us understand how to better intervene during this sensitive time. Similarly, this study was not designed to predict an improvement in IPV. These findings deviate somewhat from the majority of the literature exploring the prevalence of IPV during pregnancy. Understanding more about the factors that could buffer couples against aggression may help health professionals to better care for expectant families.

Finally, including measures of stable personality traits such as the Big 5 as well as indicators of personality pathology at baseline may be useful to better understand participants as well as their partners. Having this information collected in future studies might help create a better understanding of the participants who complete the entire

study. This information also might help researchers to predict the behavioral patterns of participants, which in turn might provide a better understanding of the occurrence of IPV in different partnerships. The conflicting literature on the existence of a rise or intensification of IPV during the transition to pregnancy, in combination with these complex findings, indicates that further research investigating this topic is critical in order to better care for pregnant women and their families.

Summary

In summary, this study was designed to attempt to bridge some of the existing conceptual and methodological gaps in the literature on IPV during the transition to parenthood. It resulted in a few successes, including a replication of past findings that IPV against pregnant women occurs frequently and that past violence may be the strongest predictor of future violence. This study also suggests some new predictors of IPV during pregnancy such as men's alcohol use, jealousy, and suspicion of infidelity, which were not previously explored. Hence, it points to the potential value of adding these variables to interventions focused on easing the transition to parenthood for women and couples. As the study and its results unfolded, a number of limitations and design flaws emerged that hindered the extent to which inferences could be drawn from these data. Therefore, this study also failed to answer some of the questions it initially set out to answer. This study was not able to provide a better understanding of who experiences an increase in IPV during pregnancy, who experiences a decrease, and why these changes occurred. In spite of the fact that no firm conclusions can be derived from the follow-up portion of this study, it has made some contributions to the existing literature on this

topic. It has provided a novel theoretical perspective through which to investigate IPV during pregnancy; it has raised many new research questions; and it has pointed to some methodological improvements that, hopefully, could encourage and inform the replication of this and other studies

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Appendix

Vita

Julianne C. Hellmuth was born in Point Pleasant, New Jersey, on June 23, 1981. She was raised in Lanoka Harbor, New Jersey and attended Lakewood Prep, now known as Monmouth Academy, from Kindergarten through her high school graduation in May of 1999. Julianne completed her Bachelor of Arts degree in Psychology from the University of Vermont in May of 2003 and went on to work in a senior research assistant position at Butler Hospital in Providence, Rhode Island until June 2005. Julianne is currently completing an APA-approved clinical internship at the VA Puget Sound, Seattle en route to her doctorate degree in Clinical Psychology at the University of Tennessee, Knoxville.