Published in final edited form as:

Psychol Violence. 2015 January ; 5(1): 66–73. doi:10.1037/a0036895.

Women's Stress, Depression, and Relationship Adjustment Profiles as They Relate to Intimate Partner Violence and Mental Health During Pregnancy and Postpartum

Julianne C. Flanagan, Ph.D.^a, Kristina Coop Gordon, Ph.D.^c, Todd M. Moore, Ph.D.^c, and Gregory L. Stuart, Ph.D.^c

^aMedical University of South Carolina

^cUniversity of Tennessee-Knoxville

Abstract

Objective—This study applied latent class analysis to examine whether homogeneous subgroups of women emerged based on their self-reported stress, depression, and relationship adjustment during pregnancy. We also examined whether women in different groups experienced different intimate partner violence (IPV) and mental health symptoms during pregnancy and postpartum.

Method—180 women completed assessments during the first 18 weeks of pregnancy and 122 completed follow-up assessments six weeks postpartum.

Results—A two-class solution best fit the data. One group reported higher mean stress and depression and poorer relationship adjustment compared to the other group. The high severity class reported more psychological IPV victimization and perpetration and more physical IPV victimization during pregnancy compared to the low severity class. Membership in the high severity class was associated with higher postpartum depression.

Conclusions—Findings highlight the associations between different profiles of mental and relational health during pregnancy and postpartum. Future studies should explore the utility of dyadic interventions aimed at reducing stress, depression, and IPV, and improving relationship adjustment as a means to improve women's health during pregnancy and postpartum. These findings also highlight the potential utility of applying person-centered analytic approaches to the study of women's and couples' health during this time period.

Keywords

Intimate partner violence; stress; postpartum depression; relationship adjustment; pregnancy

Stress, depression, and intimate relationship distress during pregnancy and postpartum are highly prevalent and have adverse impacts on the emotional and physical health of women. Across samples, approximately 6-18% of women meet diagnostic criteria for depression during pregnancy (Bergink et al., 2011; Grote et al., 2010; Matthey, Henshaw, Elliott, &

Barnett, 2006). Similarly, due to physiological, psychological, and relational factors, stress is highly prevalent and strongly linked to pregnancy and postpartum depression (Brummelte & Galea, 2010; Hung, Lin, Stocker, & Yu, 2011; Parker, Schatzberg, & Lyons, 2003). Women who experience stress and depression during pregnancy or postpartum are at increased risk for substance abuse, preeclampsia, premature birth, under-utilization of prenatal health care, intimate relationship distress, problems with breastfeeding, sleep difficulties, and thoughts of harming their infants (Carter, Grigoriadis, & Ross, 2010; Cheng & Pickler, 2009; Field, 2010; Hillerer, Neumann, & Slaterry, 2012; Webb et al., 2008). One salient correlate of stress and depression during pregnancy and postpartum is relationship adjustment (Carter et al., 2010; Whisman, Davila, & Goodman, 2011). Many studies describe pregnancy and postpartum as a challenging time for some couples, often characterized by declines in relationship adjustment (Doss, Rhoades, Stanley, & Markman, 2009; Lawrence, Rothman, Cobb, Rothman, & Bradbury, 2008; Mitnick, Heyman, & Smith Slep, 2009). Even outside the pregnancy and postpartum periods, poor relationship adjustment increases the likelihood, severity, and persistence of depression symptoms (Atkins, Dimidjian, Bedics, & Christensen, 2009). While the previously mentioned literature has separately linked stress, depression, and relationship adjustment, no studies to our knowledge have examined whether 1) homogeneous subgroups of women exist based on their symptoms of stress, depression, and relationship adjustment during pregnancy, 2) the consistency of these subgroups' stress, depression, and relationship adjustment symptoms from pregnancy to postpartum, or 3) whether women belonging to those groups experience different levels of another highly prevalent and critical health problem: intimate partner violence (IPV). The goal of this study is to fill these gaps in the literature.

A variety of normative physical, psychological, and relational changes such as fluctuating sleep patterns, hormonal changes, intimate relationship distress, fatigue, and breastfeeding contribute substantially to the occurrence of stress and depression during pregnancy and postpartum (O'Hara, 2009). Another salient and frequently overlooked correlate of stress and depression during pregnancy and postpartum is psychological and physical IPV victimization (Ludermir, Lewis, Valongueiro, de Araujo, & Araya, 2010; Tiwari et al., 2008; Woolhouse, Gartland, Hegarty, Donath, & Brown, 2012). The prevalence of any IPV victimization during pregnancy and postpartum across studies ranges between less than one percent to over fifty percent, likely due to widely varying sample populations and definitions of IPV (Bailey, 2010; Coker, Sanderson, & Dong, 2004; Ludermir et al., 2010; Perales et al., 2009; Silverman, Decker, Reed, & Raj, 2006; Taillieu & Browndridge, 2010). The prevalence of pregnancy and postpartum depression among women who experience IPV victimization is substantially higher compared to those who do not experience IPV victimization (Beydoun, Al-Sahab, Beydoun, & Tamim, 2010; Rodriguez et al., 2008).

One limitation of the literature linking IPV to pregnancy and postpartum stress and depression is the scarcity of studies assessing the prevalence and correlates of psychological IPV. The literature focusing on IPV among women in other populations suggests that psychological IPV victimization is more prevalent, frequent, and may have more severe and longer-lasting consequences compared to physical IPV (Coker, Smith, Bethea, King, & McKeown, 2000; Kavanagh et al., 2011; Pico-Alfonso, 2005). Indeed, more recent literature suggests that psychological IPV victimization is strongly linked to stress and depression

among women during pregnancy and postpartum and it is a critical health problem in this population (Creech, Davis, Howard, Pearlstein, & Zlotnick, 2012; Ludermir et al., 2010; Tiwari et al., 2008). Despite this fact, the majority of the literature in this area primarily focuses on physical IPV victimization only or combines psychological and physical IPV into one construct (Devries et al., 2010; O'Reilly, Beale, & Gillies, 2010; Urquia, O'Campo, Heaman, Janssen, & Thiessen, 2011). The present study continues the advancement of this literature by examining both psychological and physical IPV as separate constructs.

Another limitation of the literature linking IPV with stress and depression during pregnancy and postpartum is the fact that only two studies have examined the prevalence and negative sequelae of women's IPV perpetration during pregnancy and postpartum (Hellmuth, Gordon, Stuart, & Moore, in press; Tzilos, Grekin, Beatty, Chase, & Ondersma, 2010). Both studies found that women's IPV perpetration was highly prevalent and that more women in either sample reported IPV perpetration than IPV victimization. These studies also found that women's IPV perpetration was related to women's stress and depression symptom severity during pregnancy and postpartum. Therefore, this study fills another critical gap in the literature by including women's IPV perpetration in our investigation.

A third limitation of the existing literature in this area is that it has exclusively utilized variable-centered data analytic approaches such as regression and ANOVA. Variable-centered approaches are essential to identify correlational and predictive relationships between variables and to compare groups based on theoretically or empirically indicated criteria (e.g., comparing those who meet a diagnostic screening cutoff score with those who do not). While researcher-imposed group definitions are often necessary to address a specific research question, this approach may not accurately reflect sample characteristics. Variable-centered approaches cannot always accommodate groupings based on multiple variables, or delineate groups when a theoretical basis for group determinants is not available. Further, as described in the previous paragraphs, stress, depression, and relationship adjustment are closely related and share mutually causal relationships. A person-centered approach to identifying and comparing groups such as latent class analysis (LCA) is ideally suited to identify subgroups within a sample because within each latent class, each indicator variable is statistically independent of every other indicator variable. Therefore, the present study employed LCA to 1) identify and describe homogeneous subgroups of women based on their reports of stress, depression, and relationship adjustment during pregnancy, 2) to examine differences between subgroups' IPV experiences during pregnancy, and 3) to examine the extent to which group membership is associated with postpartum stress, depression, relationship adjustment, and IPV experiences. Applying LCA to the study of postpartum stress, depression, relationship adjustment, and IPV may facilitate health care providers' ability to effectively and efficiently meet the referral and treatment needs of women during pregnancy and postpartum. Exploring groupings based on these mental health symptoms may be suited to inform health care providers because this approach is consistent with mental health screenings that some pregnant and postpartum women receive in health care settings. Because this is the first study to our knowledge to apply LCA to this area of the literature, no a priori hypotheses were formed regarding the latent class structure of these constructs.

Method

Study Participants

All study procedures were consistent with the ethical principles of the American Psychological Association and were IRB-approved. Data for this study were derived from a larger study of wellbeing during pregnancy. A sample of 180 women in their first 18 weeks of pregnancy was recruited from two university affiliated health clinics. Of these, 122 participants (66% of the baseline sample) completed follow-up assessments at 6 weeks postpartum. Women who completed follow-up assessments reported significantly longer intimate relationship duration ($M = 40$ months; $SD = 45.71$) than those who did not complete the follow-up assessments ($M = 24$ months; $SD = 27.72$), but did not differ on any other domain examined in this study.

Recruitment and Assessment Procedures

Nurses and nurse practitioners who were members of the primary care team facilitated recruitment. Women who met eligibility criteria and provided informed consent completed self-report surveys and interviews in the privacy of their exam room with a trained female research assistant. Participants were remunerated with a \$25 gift card at each time point.

Materials

The Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) is a 14-item self-report questionnaire used to assess global life stress. Each item was scored on a scale from 0 to 4 (0 = "never", 1 = "almost never", 2 = "sometimes", 3 = "fairly often", and 4 = "very often"), then summed to obtain a total score. Higher scores are indicative of higher perceived stress. There is no clinical cutoff score for the PSS. A cutoff of 25 was chosen by examining quartile scores from our sample. The Cronbach's alpha for the scale was .76.

The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) is a widely used self-report measure of depression consisting of twenty items. Participants rated the frequency of various symptoms of depression on a scale of 1-4 (1 = "rarely or none of the time," 2 = "some or a little of the time", 3 = "occasionally or a moderate amount of time", and 4 = "most or all of the time"). Scores of 16 and higher reflect clinically significant depression. The Cronbach's alpha in this sample was .88.

The Dyadic Adjustment Scale (DAS; Spanier, 1976) is a 32-item self-report questionnaire. Each item was scored on a scale from 0-5 (0 = "always agree" through 5 = "always disagree"), and these scores were summed to obtain a total score ranging from 1 to 151. Higher scores on the DAS reflect higher levels of relationship adjustment, and scores below 97 reflect relationship distress. The Cronbach's alpha in this sample was .84.

The Revised Conflict Tactics Scale (CTS-2; Straus, Hamby, & Warren, 2003) was employed to measure participants' IPV victimization and perpetration. The reference period at baseline was the time since her pregnancy began. The reference period at follow-up was the time period since her baseline assessment was completed. The psychological and physical IPV subscales of the 78-item CTS-2 were utilized in the present study. Consistent with the

procedure outlined by Straus and colleagues (Straus et al., 2003), the frequency of each behavior was recoded such that the midpoint of each range is the score value (never=0, once=1, twice=2, 3-5 times=4, 6-10 times=8, 11-20 times=15, more than 20 times=25). These values were summed to obtain a total frequency score for each subscale. The psychological IPV victimization and perpetration subscales consisted of eight items each and assessed behaviors such as “called my partner fat or ugly” and “destroyed something belonging to my partner” (Cronbach’s alphas = .84 and = .74, respectively). The physical victimization and perpetration subscales consisted of 12 items each and assessed behaviors such as “threw something at my partner that could hurt”, pushed or shoved my partner”, and “punched or hit my partner with something that could hurt” (Cronbach’s alphas = .89 and = .87, respectively).

Data Analysis

Latent class analysis (LCA; Lubke & Muthén, 2005; McCutcheon, 1987) using Mplus 6.0 (Muthén & Muthén, 2007) was used to identify and describe distinct homogeneous subgroups (i.e., latent classes) of stress, depression, and relationship adjustment during pregnancy within our sample. Following the process outlined by Nylund and colleagues (2007), we first examined model fit associated with a one-class solution. Next, we tested the fit of models in which additional classes were added, one at a time, until the fit indices indicated no statistically significant improvement. For all models with more than one class, we examined the extent to which class membership was associated with demographic covariates including age, annual household income, and relationship length. We also examined differences across symptom profiles on baseline auxiliary variables including the severity of psychological and physical IPV victimization and perpetration during pregnancy. Means and variances of each auxiliary variable were examined using posterior probability-based multiple imputation and Wald chi-square significance tests. Finally, we examined the extent to which class membership predicted dichotomized postpartum stress, depression, relationship adjustment, and psychological and physical IPV victimization and perpetration through multinomial logistic regression.

Among its many advantages, LCA allows variance among classes to vary, provides formal statistical fit indices for maximum accuracy when interpreting results, and flexible measurement error. LCA also does not rely on the traditional assumptions of statistical models such as normal distributions and linear relationships that are often violated in variable-centered analyses, especially when studying low frequency outcome data such as IPV (Atkins & Gallop, 2007). Therefore, LCA findings are less subject to bias in interpretation. Multiple indices of model fit were examined to determine the optimal number of classes, including the Akaike information criterion (AIC) and Bayesian Information Criterion (BIC), the Lo-Mendell-Rubin Likelihood Ratio Test (LMR LRT), and entropy values. Lower AIC and BIC values reflect better model fit. LMR LRT $p < 0.05$ indicates significant improvement in fit compared to the fit of the previously tested model that included one less class (Nylund et al., 2007). Entropy indicates what percentage of the time individual members of the sample were correctly identified in their respective classes. Entropy values improve as they approach one.

Results

Means and standard deviations of all study variables are presented in Table 1. Comparative fit statistics of each LCA model tested are presented in Table 2. A two-class solution best fit the data. One group was comprised of 40.8% of the sample and reported higher mean postpartum stress and depression symptom severity and poorer relationship adjustment compared to the other group, which was comprised of 59.2% of the sample. The second group of women reported lower mean postpartum stress and depression severity and better relationship adjustment compared to the other group. Consequently, these groups are referred to as the “high severity group” and “low severity group”. The severity of postpartum stress, depression, and relationship adjustment across latent classes is depicted in Figure 1.

Means and standard errors describing the characteristics of both latent classes are presented in Table 3. Wald chi-square tests and effect size estimates (Cohen’s *d*; Cohen, 1987) examining differences between the means of each group’s baseline stress, depression, and IPV victimization and perpetration characteristics are also presented in Table 3. The high severity group reported higher psychological IPV victimization and perpetration and higher physical IPV victimization during pregnancy compared to the low severity group. Membership in the high severity group also predicted modest, but statistically significant increases in the odds of experiencing postpartum depression ($OR=2.42$, 95% $CI=.03-.32$). Class membership at baseline was not associated with demographic covariates or postpartum stress, postpartum relationship adjustment, or postpartum IPV experiences.

Discussion

Findings from this study identified two distinct pregnancy stress, depression, and relationship adjustment profiles in this sample. The smaller high severity group reported higher stress and depression symptom severity and poorer relationship adjustment during pregnancy compared to the low severity group. These groups were distinguished by several additional IPV-related auxiliary variables. First, the high severity group reported substantially more psychological IPV victimization and perpetration and physical IPV victimization during pregnancy compared to the low severity group. Membership in the high severity group was also associated with a higher probability of meeting cutoff scores for postpartum depression.

These findings are congruent with existing literature suggesting that women’s mental health problems, specifically depression, during pregnancy is a salient predictor of whether a woman will experience postpartum depression and how severe that depression will be (O’Hara, 2009). Our findings add to this literature by suggesting that whereas women’s symptom profiles during pregnancy are associated with postpartum depression, the extent to which group membership predicted stress, relationship adjustment, or IPV experiences postpartum was less salient. This finding suggests that the dyadic context, including IPV, in which couples are transitioning from pregnancy to postpartum may shift over time. The lack of predictability of these variables in this sample suggest that researchers and healthcare providers clinicians may find benefit in conducting multiple assessments of IPV experiences

and relational health, as these factors, and women's intervention needs, may change over time. Indeed, previous studies have noted that IPV may cease, maintain, increase, or initiate during pregnancy, but few predictors of these changes have been identified (Burch & Gallup, 2004; Moore, Frohworth, & Miller, 2010; Perales et al., 2009). Our findings also suggest that the relationship context, including relationship adjustment and different forms of IPV, are important longitudinal correlates of mental health among women during pregnancy and postpartum. These topics warrant further discussion in the literature.

Research Implications

If replicated in larger studies, these findings may inform future treatment development research for women in this population. For example, our findings regarding the group characteristics of both latent classes (see Table 3) suggest that traditional cutoffs of 16 on the CES-D and 97 on the DAS do not reflect the natural group differences in this sample. If replicated in larger and more diverse samples, these findings suggest that practitioners and researchers may find more benefit in targeting women with the higher stress, depression, and poorer relationship adjustment scores found in this study. Additionally, the prevalence of psychological IPV victimization and perpetration in this sample is higher than many other community and clinical samples (Sullivan, McPartland, Armeli, Jaquier, & Tennen, 2012; Tjaden & Thonnes, 2000), suggesting that providing services to help women and couples better manage dyadic conflict may improve women's pre- and postnatal health.

These findings suggest that the relationship context, and psychological IPV in particular, may be essential factors to address to improve screening and prevention efforts to improve the health of women receiving pre- and postnatal care. In particular, the longitudinal association between symptom profiles identified during pregnancy and the risk for postpartum depression warrant further attention both clinically and in future research. While class membership did not predict postpartum IPV this sample, members of the high severity class experienced greater IPV during pregnancy, which may have contributed to their increased risk for postpartum depression. Because substantial differences were found between the high and low severity groups in terms of the mean frequency scores of psychological IPV victimization and perpetration during pregnancy, future studies employing larger samples should investigate causal pathways between pregnancy symptom profiles identified here, associated IPV experiences, and changes in mental health and relational functioning over time.

Research examining women from other populations suggest that the negative sequelae of psychological IPV are at least as persistent and detrimental, if not more so, compared to those that result from physical IPV (Coker et al., 2000; Lawrence, Yoon, Langer, & Ro, 2009). Unfortunately, many women are not screened effectively for any type of IPV during their pre- and postnatal medical visits and screening itself is not usually effective to reduce women's IPV victimization (Jack, Jamieson, Wathen, & MacMillan, 2008; Nelson, Bougatsos, & Blazina, 2012). Further, IPV assessments employed in clinical and research settings often fail to measure psychological IPV. Treatments currently under development target physical, not psychological IPV, collectively suggesting that psychological IPV may be frequently overlooked as a significant health problem among women during pregnancy

and postpartum (Hellmuth et al., in press; Kiely, El-Mohandes, El-Khorazaty, Blake, & Gantz, 2010; Reichenheim & Moraes, 2004). To our knowledge, only one study has tested a treatment to reduce mental health problems among pregnant women experiencing IPV (Zlotnick, Capezza, & Parker, 2011). Despite null findings for this particular intervention approach, our findings suggest that this line of study should be continued and advanced to include a focus on psychological IPV and couple-based interventions. Interventions to improve individual and dyadic functioning among pregnant and postpartum women may improve long term individual and family health. Brief interventions that may be well-suited to implementation in medical settings may also be important to consider. Taking into consideration the findings of this study and others that document the relevance of dyadic factors to postpartum stress and depression (Iles, Slade, & Spiby, 2011; Whisman et al., 2011), conjoint couples interventions should be explored as a strategy to reduce stress, depression, and IPV among women during pregnancy and postpartum.

Limitations

These findings are limited by several factors including bias that might be incurred by using only self-report data, a small sample size, and a high attrition rate. The small sample size may have limited our ability to detect a three-class solution from these data and precluded us from examining class membership transitions and predictors of those transitions over time. Therefore, our findings should be replicated in larger, more representative samples of pregnant women. Although findings indicate that only one difference emerged between those who completed follow-up and those who did not (e.g., relationship length), the possibility remains that these groups may have differed on demographic or other variables not examined in this study. Because these data were collected from women enrolled in prenatal care, the generalizability of our findings may be limited to this population of women. These findings should be replicated on larger samples of women in both clinical and community populations. Further, despite the many advantages of employing a person-centered approach, the nature of this type of analysis precludes us from making causal attributions regarding the relationship between the indicator and auxiliary variables. Our approach is also limited by the absence of additional time points which could derive more information about the trajectories of the variables being investigated here. Future research would improve upon the present study's design by employing micro-longitudinal data collection methods, more assessment time points, and examining differential causal relationships between dyadic adjustment, IPV, and stress and depression during pregnancy and postpartum.

Clinical and Policy Implications

The emergence of stress, depression, and relationship adjustment profiles, in combination with the association of these profiles with postpartum depression are the key findings of this study. These results suggest that differences between these groups on some domains may emerge during pregnancy and predict future mental health problems. The finding that baseline symptom profiles did not predict future IPV indicates that IPV experiences may transition over time, suggesting a potential need for multiple IPV assessments and tailored intervention in the context of pre- and postnatal care. Perhaps different and shifting

dynamics may be present in the lives of each of these groups of women which contribute to the occurrence of individual and dyadic distress or wellbeing.

These findings also echo the existing literature suggesting that early, effective screening and intervention to reduce stress and depression and improve dyadic functioning in this population of women should be explored in order to facilitate longer-term mental health. Unfortunately, causal attributions cannot be made from this study about why trajectories of each group were difficult to identify. While much literature suggests that IPV victimization causes or increases the severity of postpartum stress and depression (Faisal-Cury, Menezes, d'Oliveira, Schraiber, & Lopes; Rodriguez et al., 2008), those studies have not controlled for women's IPV perpetration. Considering that literature among other populations of women suggests that women's IPV perpetration also has detrimental effects on women's wellbeing (Shorey et al., 2012; Stuart, Moore, Gordon, Ramsey, & Kahler, 2006; Testa, Hoffman, & Leonard, 2011), the directionality of the causal relationship between IPV and stress, depression, and relationship adjustment during pregnancy and postpartum remains unclear (Iverson et al., 2011). Therefore, the differences that emerged between groups at baseline, but did not remain consistent at follow-up, may inform future research to identify intervention strategies for this population.

Conclusions

In this sample, two groups of women emerged, each characterized by different stress, depression, and relationship adjustment profiles and different trajectories of those profiles. These groups of women were further delineated by their self-reported psychological IPV victimization and perpetration and physical IPV victimization during pregnancy. Group membership at baseline was also associated with postpartum depression. Future research should explore the efficacy of early screening and intervention, as well as screening at multiple time points, to reduce stress and depression and improve dyadic functioning in this population. These efforts may be facilitated by addressing both individual and dyadic issues such as relationship adjustment and psychological IPV.

Acknowledgments

This manuscript is the result of work supported, in part, by resources from the National Institutes on Alcohol Abuse and Alcoholism (F31 AA016706 and K24AA019707), the National Institute on Drug Abuse (T32DA019426), and the National Institute on Child and Human Development and the Office of Research on Women's Health (K12HD055885).

References

- Atkins DC, Dimidjian S, Bedics JD, Christensen A. Couple discord and depression in couples during couple therapy and in depressed individuals during depression treatment. *Journal of Consulting and Clinical Psychology*. 2009; 77(6):1089. doi: 10.1037/a0017119. [PubMed: 19968385]
- Atkins DC, Gallop RJ. Rethinking how family researchers model infrequent outcomes: a tutorial on count regression and zero-inflated models. *Journal of Family Psychology*. 2007; 21(4):726. doi: 10.1037/0893-3200.21.4.726. [PubMed: 18179344]
- Bailey BA. Partner violence during pregnancy: prevalence, effects, screening, and management. *International Journal of Womens Health*. 2010; 2:183–197.

- Bergink V, Kooistra L, Lambregtse-van den Berg MP, Wijnen H, Bunevicius R, van Baar A, Pop V. Validation of the Edinburgh Depression Scale during pregnancy. *Journal of Psychosomatic Research*. 2011; 70(4):385–389. [PubMed: 21414460]
- Beydoun HA, Al-Sahab B, Beydoun MA, Tamim H. Intimate partner violence as a risk factor for postpartum depression among Canadian women in the Maternity Experience Survey. *Annals of Epidemiology*. 2010; 20(8):575–583. doi: 10.1016/j.annepidem.2010.05.011. [PubMed: 20609336]
- Brummelte S, Galea LAM. Depression during pregnancy and postpartum: Contribution of stress and ovarian hormones. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*. 2010; 34(5): 766–776. doi: 10.1016/j.pnpbp.2009.09.006. [PubMed: 19751794]
- Bryk AS, Raudenbush SW. Application of hierarchical linear models to assessing change. *Psychological Bulletin*. 1987; 101:147–158. doi: 10.1037/0033-2909.101.1.147.
- Burch RL, Gallup GG. Pregnancy as a Stimulus for Domestic Violence. *Journal of Family Violence*. 2004; 19(4):243–247. doi: 10.1023/B:JOFV.0000032634.40840.48.
- Carter W, Grigoriadis S, Ross LE. Relationship distress and depression in postpartum women: literature review and introduction of a conjoint interpersonal psychotherapy intervention. *Archives of Women's Mental Health*. 2010; 13(3):279–284. doi: 10.1007/s00737-009-0136-8.
- Cheng C, Pickler RH. Effects of stress and social support on postpartum health of Chinese mothers in the United States. *Research in Nursing & Health*. 2009; 32(6):582–591. doi: 10.1002/nur.20356. [PubMed: 19877163]
- Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *Journal of Health and Social Behavior*. 1983; 24(4):385–396. [PubMed: 6668417]
- Coker AL, Sanderson M, Dong B. Partner violence during pregnancy and risk of adverse pregnancy outcomes. *Paediatr Perinat Epidemiol*. 2004; 18(4):260–269. doi: 10.1111/j.1365-3016.2004.00569.x. [PubMed: 15255879]
- Coker AL, Smith PH, Bethea L, King MR, McKeown R. Physical health consequences of physical and psychological intimate partner violence. *Archives of Family Medicine*. 2000; 9(5):451–457. [PubMed: 10810951]
- Creech S, Davis K, Howard M, Pearlstein T, Zlotnick C. Psychological/verbal abuse and utilization of mental health care in perinatal women seeking treatment for depression. *Archives of Women's Mental Health*. 2012; 15(5):361–365. doi: 10.1007/s00737-012-0294-y.
- Devries KM, Kishor S, Johnson H, Stöckl H, Bacchus LJ, Garcia-Moreno C, Watts C. Intimate partner violence during pregnancy: analysis of prevalence data from 19 countries. *Reproductive Health Matters*. 2010; 18(36):158–170. doi: 10.1016/s0968-8080(10)36533-5. [PubMed: 21111360]
- Doss BD, Rhoades GK, Stanley SM, Markman HJ. The effect of the transition to parenthood on relationship quality: an 8-year prospective study. *Journal of Personality and Social Psychology*. 2009; 96(3):601–619. doi: 10.1037/a0013969. [PubMed: 19254107]
- Faisal-Cury A, Menezes P, d'Oliveira A, Schraiber L, Lopes C. Temporal Relationship Between Intimate Partner Violence and Postpartum Depression in a Sample of Low Income Women. *Maternal and Child Health Journal*. :1–7. doi: 10.1007/s10995-012-1127-3.
- Field T. Postpartum depression effects on early interactions, parenting, and safety practices: a review. *Infant Behavior and Development*. 2010; 33(1):1–6. doi: 10.1016/j.infbeh.2009.10.005. [PubMed: 19962196]
- Grote NK, Bridge JA, Gavin AR, Melville JL, Iyengar S, Katon WJ. A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. *Archives of General Psychiatry*. 2010; 67(10):1012. doi: 10.1001/archgenpsychiatry.2010.111. [PubMed: 20921117]
- Hellmuth JC, Gordon KC, Stuart GL, Moore TM. Women's Use of Intimate Partner Violence During Pregnancy and Postpartum. *Maternal and Child Health Journal*. (in press).
- Hillier KM, Neumann ID, Slatery DA. From Stress to Postpartum Mood and Anxiety Disorders: How Chronic Peripartum Stress Can Impair Maternal Adaptations. *Neuroendocrinology*. 2012; 95(1):22–38. doi: 10.1159/000330445. [PubMed: 22042058]
- Hung CH, Lin C, Stocker J, Yu C. Predictors of postpartum stress. *Journal of Clinical Nursing*. 2011; 20(5-6):666–674. doi: 10.1111/j.1365-2702.2010.03555.x. [PubMed: 21320195]

- Iles J, Slade P, Spiiby H. Posttraumatic stress symptoms and postpartum depression in couples after childbirth: The role of partner support and attachment. *Journal of Anxiety Disorders*. 2011; 25(4): 520–530. doi: 10.1016/j.janxdis.2010.12.006. [PubMed: 21295438]
- Iverson KM, Gradus JL, Resick PA, Suvak MK, Smith KF, Monson CM. Cognitive-behavioral therapy for PTSD and depression symptoms reduces risk for future intimate partner violence among interpersonal trauma survivors. *Journal of Consulting and Clinical Psychology*. 2011; 79(2):193–202. doi: 10.1037/a0022512. [PubMed: 21341889]
- Jack SM, Jamieson E, Wathen CN, MacMillan HL. The Feasibility of Screening for Intimate Partner Violence during Postpartum Home Visits. *Canadian Journal of Nursing Research*. 2008; 40(2): 150–170. [PubMed: 18714904]
- Kavanagh AM, Kelly MT, Krnjacki L, Thornton L, Jolley D, Subramanian SV, Bentley RJ. Access to alcohol outlets and harmful alcohol consumption: a multi-level study in Melbourne, Australia. *Addiction*. 2011; 106(10):1772–1779. doi: 10.1111/j.1360-0443.2011.03510.x. [PubMed: 21615583]
- Kiely M, El-Mohandes AA, El-Khorazaty MN, Blake SM, Gantz MG. An integrated intervention to reduce intimate partner violence in pregnancy: a randomized controlled trial. *Obstetrics and Gynecology*. 2010; 115(2):273–283. doi: 10.1097/AOG.0b013e3181cbd482. [PubMed: 20093899]
- Lawrence E, Rothman AD, Cobb RJ, Rothman MT, Bradbury TN. Marital satisfaction across the transition to parenthood. *Journal of Family Psychology*. 2008; 22(1):41–50. doi: 10.1037/0893-3200.22.1.41. [PubMed: 18266531]
- Lawrence E, Yoon J, Langer A, Ro E. Is Psychological Aggression as Detrimental as Physical Aggression? The Independent Effects of Psychological Aggression on Depression and Anxiety Symptoms. *Violence & Victims*. 2009; 24(1):20–35. doi: 10.1891/0886-6708.24.1.20. [PubMed: 19297883]
- Lubke GH, Muthén BO. Investigating population heterogeneity with factor mixture models. *Psychological Methods*. 2005; 10(1) doi: 10.1037/1082-989X.10.1.21.
- Ludermir AB, Lewis G, Valongueiro SA, de Araujo TVB, Araya R. Violence against women by their intimate partner during pregnancy and postnatal depression: a prospective cohort study. *The Lancet*. 2010; 376:903–910. doi: 10.1016/S0140-6736(10)60887-2.
- Matthey S, Henshaw C, Elliott S, Barnett B. Variability in use of cut-off scores and formats on the Edinburgh Postnatal Depression Scale: implications for clinical and research practice. *Archives of Women's Mental Health*. 2006; 9:309–315. doi: 10.1007/s00737-006-0152-x.
- McCutcheon, AL. Latent class analysis. Vol. Vol. 64. Sage Publications, Inc.; 1987.
- Mitnick DM, Heyman RE, Smith Slep AM. Changes in relationship satisfaction across the transition to parenthood: a meta-analysis. *Journal of Family Psychology*. 2009; 23(6):848–852. doi: 10.1037/a0017004. [PubMed: 20001143]
- Moore AM, Frohworth L, Miller E. Male reproductive control of women who have experienced intimate partner violence in the United States. *Social Science & Medicine*. 2010; 70(11):1737–1744. doi: 10.1016/j.socscimed.2010.02.009. [PubMed: 20359808]
- Muthén, LK.; Muthén, BO. Mplus User's Guide. Muthén & Muthén; Los Angeles, CA: 2007.
- Nelson HD, Bougatso C, Blazina I. Screening Women for Intimate Partner Violence. *Annals of Internal Medicine*. 2012:E-447. doi: 10.1059/0003-4819-156-11-201206050-00447.
- Nylund KL, Asparouhov T, Muthén BO. Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling*. 2007; 14(4):535–569. doi: 10.1080/10705510701575396.
- O'Hara MW. Postpartum depression: what we know. *Journal of Clinical Psychology*. 2009; 65(12): 1258–1269. doi: 10.1002/jclp.20644. [PubMed: 19827112]
- O'Reilly R, Beale B, Gillies D. Screening and intervention for domestic violence during pregnancy care: a systematic review. *Trauma, Violence, & Abuse*. 2010; 11(4):190–201. doi: 10.1177/1524838010378298.
- Parker KJ, Schatzberg AF, Lyons DM. Neuroendocrine aspects of hypercortisolism in major depression. *Hormones and Behavior*. 2003; 43:60–66. doi: 10.1016/S0018-506X(02)00016-8. [PubMed: 12614635]

- Perales MT, Cripe SM, Lam N, Sanchez SE, Sanchez E, Williams MA. Prevalence, Types, and Pattern of Intimate Partner Violence Among Pregnant Women in Lima, Peru. *Violence Against Women*. 2009; 15(2):224–250. doi: 10.1177/1077801208329387. [PubMed: 19126836]
- Pico-Alfonso MA. Psychological intimate partner violence: the major predictor of posttraumatic stress disorder in abused women. *Neuroscience & Biobehavioral Reviews*. 2005; 29(1):181–193. doi: 10.1016/j.neubiorev.2004.08.010. [PubMed: 15652265]
- Radloff LS. The CES-D Scale. *Applied Psychological Measurement*. 1977; 1(3):385–401. doi: 10.1177/014662167700100306.
- Reichenheim ME, Moraes CL. Comparison between the abuse assessment screen and the revised conflict tactics scales for measuring physical violence during pregnancy. *Journal of Epidemiology and Community Health*. 2004; 58(6):523–527. [PubMed: 15143123]
- Rodriguez MA, Heilemann MV, Fielder E, Ang A, Nevarez F, Mangione CM. Intimate partner violence, depression, and PTSD among pregnant Latina women. *Annals of Family Medicine*. 2008; 6(1):44–52. doi: 10.1370/afm.743. [PubMed: 18195314]
- Shorey RC, Elmquist J, Ninnemann A, Brasfield H, Febres J, Rothman EF, Stuart GL. The Association Between Intimate Partner Violence Perpetration, Victimization, and Mental Health Among Women Arrested for Domestic Violence. *Partner Abuse*. 2012; 3(1):3–21. doi: 10.1891/1946-6560.3.1.3. [PubMed: 22792418]
- Silverman JG, Decker MR, Reed E, Raj A. Intimate partner violence around the time of pregnancy: association with breastfeeding behavior. *Journal of Womens Health*. 2006; 15(8):934–940. doi: 10.1089/jwh.2006.15.934.
- Spanier GB. Measuring Dyadic Adjustment: New Scales for Assessing the Quality of Marriage and Similar Dyads. *Journal of Marriage and Family*. 1976; 38(1):15–28. doi: 10.2307/350547.
- Straus, MA.; Hamby, SL.; Warren, WL. *The Conflict Tactics Scales Handbook: Revised Conflict Tactics Scale (CTS2) and CTS: Parent-Child Version (CTSPC)*. Western Psychological Services; Los Angeles, CA, USA: 2003.
- Stuart GL, Moore TM, Gordon KC, Ramsey SE, Kahler CW. Psychopathology in Women Arrested for Domestic Violence. *Journal of Interpersonal Violence*. 2006; 21(3):376–389. doi: 10.1177/0886260505282888. [PubMed: 16443597]
- Sullivan TP, McPartland TS, Armeli S, Jaquier V, Tennen H. Is it the Exception or the Rule? Daily Co-Occurrence of Physical, Sexual, and Psychological Partner Violence in a 90-Day Study of Substance-Using, Community Women. *Psychology of Violence*. 2012; 2(2):154–164. doi: 10.1037/a0027106.
- Taillieu TL, Brownridge DA. Violence against pregnant women: Prevalence, patterns, risk factors, theories, and directions for future research. *Aggression and Violent Behavior*. 2010; 15(1):14–35. doi: 10.1016/j.avb.2009.07.013.
- Testa M, Hoffman JH, Leonard KE. Female intimate partner violence perpetration: stability and predictors of mutual and nonmutual aggression across the first year of college. *Aggressive Behavior*. 2011; 37(4):362–373. doi: 10.1002/ab.20391. [PubMed: 21462201]
- Tiwari A, Chan KL, Fong D, Brownridge DA, Lam H, Wong B. The impact of psychological abuse by an intimate partner on the mental health of pregnant women. *British Journal of Obstetrics and Gynecology*. 2008; 115:377–384. doi: 10.1111/j.1471-0528.2007.01593.x.
- Tjaden P, Thoennes N. Prevalence and Consequences of Male-to-female and Female-to-male Intimate Partner Violence as Measured by the National Violence Against Women Survey. *Violence Against Women*. 2000; 6(2):142–161. doi: 10.1177/10778010022181769.
- Tzilos GK, Grekin ER, Beatty JR, Chase SK, Ondersma SJ. Commission versus receipt of violence during pregnancy: associations with substance abuse variables. *Journal of Interpersonal Violence*. 2010; 25(10):1928–1940. doi: 10.1177/0886260509354507. [PubMed: 19966245]
- Urquia ML, O'Campo PJ, Heaman MI, Janssen PA, Thiessen KR. Experiences of violence before and during pregnancy and adverse pregnancy outcomes: An analysis of the Canadian Maternity Experiences Survey. *BMC Pregnancy and Childbirth*. 2011; 11(1):42. [PubMed: 21649909]
- Webb DA, Bloch JR, Coyne JC, Chung EK, Bennett IM, Culhane JF. Postpartum physical symptoms in new mothers: their relationship to functional limitations and emotional well-being. *Birth: Issues in Perinatal Care*. 2008; 35:179–187. doi: 10.1111/j.1523-536X.2008.00238.x.

- Whisman MA, Davila J, Goodman SH. Relationship adjustment, depression, and anxiety during pregnancy and the postpartum period. *Journal of Family Psychology*. 2011; 25(3):375. doi: 10.1037/a0023790. [PubMed: 21553959]
- Woolhouse H, Gartland D, Hegarty K, Donath S, Brown SJ. Depressive symptoms and intimate partner violence in the 12 months after childbirth: a prospective pregnancy cohort study. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2012; 119(3):315–323. doi: 10.1111/j.1471-0528.2011.03219.x. [PubMed: 22145631]
- Zlotnick C, Capezza N, Parker D. An interpersonally based intervention for low-income pregnant women with intimate partner violence: a pilot study. *Archives of Women's Mental Health*. 2011; 14(1):55–65. doi: 10.1007/s00737-010-0195-x.

Figure 1.
Severity of Postpartum (Wave 2) Stress and Depression Symptoms Across Latent Classes

Table 1
Descriptive statistics of study variables during pregnancy (Time 1) and postpartum (Time 2).

	Baseline			Follow-up		
	Prevalence	Observed Range	Mean (SD)	Prevalence	Observed Range	Mean (SD)
Stress	70 (38.9%)	5-34	22.38 (6.14)	29 (16.1%)	0-41	19.81 (7.05)
Depression	55 (45.1%)	2-60	16.10 (10.42)	43 (35.2%)	0-47	14.80 (11.09)
Dyadic Adjustment	18 (14.8%)	27-146	115.67 (22.66)	20 (16.4%)	16-143	113.99 (21.61)
IPV Victimization						
Psychological	89 (73.0%)	0-104	13.19 (22.49)	66 (54.1%)	0-107	9.09 (17.98)
Physical	20 (16.4%)	0-87	2.40 (10.59)	13 (10.7%)	0-52	1.53 (7.55)
IPV Perpetration						
Psychological	77 (63.1%)	0-129	13.56 (21.66)	79 (64.8%)	0-137	11.06 (20.81)
Physical	26 (21.3%)	0-78	1.74 (7.83)	20 (16.4%)	0-108	2.19 (11.65)

Note. N=122. IPV = Intimate partner violence. Prevalence of IPV reflects the number and percentage of women who reported at least one incident of that type of IPV. Prevalence of stress, depression, and dyadic adjustment variables represent the number and percentage of women who reported PSS scores of 25 or higher, CES-D scores of 16 or higher, and DAS scores of 97 or below.

Table 2

Comparative fit statistics of exploratory latent class analysis models at Time 1.

	1 class	2 classes	3 classes
AIC	13781.28	2283.62	2404.06
BIC	13864.15	2274.71	2394.22
LMR LRT <i>p-value</i>	-	.02	.13
Entropy	-	.86	.83
Class membership	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Class 1	180 (100%)	107 (59.2%)	105 (58.3%)
Class 2	-	73 (40.8%)	72 (40.0%)
Class 3	-	-	3 (1.7%)

Note. AIC= Akaike's information criterion; BIC= adjusted Bayesian information criterion; LMR LRT= Lo-Mendell-Rubin likelihood ratio test *p*-value. A significant *p*-value indicates that the one less class model has poorer fit compared with the current model.

Table 3

Comparisons of latent class characteristics during pregnancy (Time 1).

	Low Severity Class n=118		High Severity Class n=62		Wald Chi-Square	Cohen's <i>d</i>
	Mean (S.E.)	Mean (S.E.)	Mean (S.E.)	Mean (S.E.)		
During Pregnancy						
Stress	19.73 (1.07)	26.49 (.67)	-	-		
Depression	11.04 (1.27)	26.07 (2.15)	-	-		
Relationship Adjustment	125.44 (2.31)	102.32 (4.77)	-	-		
Psychological IPV Victimization	7.96 (2.42)	20.62 (4.34)	5.98**			3.60
Physical IPV Victimization	.47 (.26)	5.79 (2.62)	4.09*			2.86
Psychological IPV Perpetration	8.81 (2.53)	19.74 (3.94)	4.68*			3.30
Physical IPV Perpetration	.57 (.29)	3.57 (1.93)	2.33			-

** Note. =p .01.

* =p .05. IPV= intimate partner violence. Cohen's *d* is an estimate of effect size.