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Relationship between Stress Coping Styles and Pregnancy Complications among Women Exposed to Hurricane Katrina

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Abstract

Objective—To examine the relationship between maternal stress exposure, stress coping styles, and pregnancy complications.

Design—Quantitative, cross-sectional, and prospective study.

Setting—Tulane-Lakeside Hospital, New Orleans, LA and Women's Hospital, Baton Rouge, LA.

Participants—The study included 146 women (122 from New Orleans and 24 from Baton Rouge), who were pregnant during or immediately after Hurricane Katrina.

Methods—Participants were interviewed regarding their hurricane experiences and perceived stress, and coping styles were assessed using the Brief COPE. Medical charts were also reviewed to obtain information about pregnancy outcomes. Logistic regression was performed to determine possible associations.

Results—Hurricane exposure was significantly associated with induction of labor (adjusted odds ratio (aOR) = 1.39; 95% confidence interval (CI) = 1.03, 1.86; $P=0.03$) and current perceived stress (aOR = 1.50; CI = 1.34, 1.99; $P<0.01$). Stress perception significantly predisposed to pregnancy-induced hypertension (aOR = 1.16; CI = 1.05, 1.30; $P<0.01$) and gestational diabetes (aOR = 1.13; CI = 1.02, 1.25; $P=0.03$). Use of planning, acceptance, humor, instrumental support, and venting coping styles were associated with a significantly reduced occurrence of pregnancy complications ($P<0.05$). Higher rates for gestational diabetes was found among women using the denial coping style (aOR = 2.25; CI = 1.14, 4.45; $P=0.02$).

Conclusion—Exposure to disaster-related stress may complicate pregnancy, while some coping styles may mitigate its effects. Further research should explore how coping styles may mitigate or

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exacerbate the effect of major stressors and how positive coping styles can be encouraged or augmented.

Keywords

stress; coping styles; pregnancy-induced hypertension; gestational diabetes; induction of labor; cesarean; Hurricane Katrina

Prevention of pregnancy-related maternal health problems is a critical public health priority (Centers for Disease Control and Prevention, 2014). Hypertensive disorders of pregnancy are a leading cause of maternal and perinatal mortality and morbidity (North et al., 2005; Roy-Matton, Moutquin, Brown, Carrier, & Bell, 2011), responsible for 10 -15% of pregnancy-related deaths worldwide, and a leading cause of medically indicated premature delivery (Duley, 2009). Gestational diabetes mellitus (GDM) affects an estimated 4 -10 % of all pregnancies in the United States (American Diabetes Association, 2009) and has been associated with adverse maternal and infant outcomes such as pregnancy-induced hypertension, macrosomia, shoulder dystocia, and birth injuries (Wendland et al., 2012; Young & Ecker, 2013). Concerns have also been expressed about the increase in inductions and cesarean births, which are associated with higher costs, more preterm delivery, and risks of surgical complications and correlate with increased rates of maternal deaths (Clark et al., 2008; Huizink, Robles de Medina, Mulder, Visser, & Buitelaar, 2003; Rebelo, Da Rocha, Cortes, Dutra, & Kac, 2010).

These pregnancy complications may be precipitated by perinatal stress exposure. Leeners et al. (2007) found an almost two-fold increased risk of hypertensive diseases in pregnancy among women exposed to stressful life events (Leeners, Neumaier-Wagner, Kuse, Stiller, & Rath, 2007). Increased incidence of pre-eclampsia and hypertensive disorders was discovered after the invasion of Kuwait in 1990-1991 (Makhseed, Musini, Hassan, & Saker, 1999). In the Pregnancy, Infection, and Nutrition (PIN) study, pre-eclampsia was associated with higher levels of stressful life events and perceived stress, but pregnancy-induced hypertension was not (Harville, Savitz, Dole, Herring, & Thorp, 2009). Investigators in several studies have also found an increase in hypertensive disorders associated with job strain (Klonoff-Cohen, Cross, & Pieper, 1996; Landsbergis & Hatch, 1996; Marcoux, Berube, Brisson, & Mondor, 1999). In a Nigerian study, the authors found that stressful work and home environments were associated with developing pre-eclampsia (Anorlu, Iwuala, & Odum, 2005), but not every study corroborates this (Vollebregt et al., 2008).

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The relationship between GDM and stress is less studied; in a study of 2690 women conducted using data obtained from the New York State (NYS) Pregnancy Risk Assessment Monitoring System survey for 2004-06 and the NYS birth certificates, Hosler et al. (2011) found that having five or more stressful events 12 months before the infant was born was significantly associated with GDM (OR = 2.49, 95% CI 1.49, 4.16) (Hosler, Nayak, & Radigan, 2011). Prenatal stress may also affect delivery pattern. Saunders et al. (2006) found

¹Callouts: There are limited data on the relationship between perinatal stress exposure and pregnancy complications.

a higher likelihood of unplanned cesarean birth among those exposed to prenatal maternal stress (Saunders, Lobel, Veloso, & Meyer, 2006); Swedish investigators found that increased stress and worry in pregnancy was associated with emergency cesarean (Wangel, Molin, Ostman, & Jernstrom, 2011); and self-perceived distress was associated with cesarean in a German study (Martini, Knappe, Beesdo-Baum, Lieb, & Wittchen, 2010). Researchers have also reported higher rates of cesarean birth after Hurricanes Katrina and Andrew (Harville, Tran, Xiong, & Buekens, 2010; Zahran, Snodgrass, Peek, & Weiler, 2010).

Coping is the term used to describe cognitive and behavioral efforts to manage psychological stress in order to ensure psychological and physiological well-being (Lazarus, 1993). Stress coping styles are classified broadly into problem-focused styles, such as active coping, planning, suppression of competing activities, restraint coping, and seeking of instrumental social support and emotion-focused styles, such as seeking of emotional social support, positive reinterpretation, acceptance, denial and turning to religion (Table 1) (Carver, Scheier, & Weintraub, 1989). Only a few studies have been conducted to address the relationship between coping style and pregnancy complications. Higher emotion-focused coping was associated with fewer pregnancy-related complaints in one study (Huizink, Robles de Medina, Mulder, Visser, & Buitelaar, 2002). In the PIN study, lower John Henryism coping (a form of active, purposeful coping) was associated with a lower prevalence of pregnancy-induced hypertension (Harville, Savitz, et al., 2009). In another study, distancing was associated with higher risk for preterm birth, but accepting responsibility, confrontative, avoidant, problem-solving, positive reappraisal, seeking social support, and self-controlling styles had no relationship with this outcome (Messer, Dole, Kaufman, & Savitz, 2005).

In a recent systematic review, it was determined that disaster impacts maternal mental health and some perinatal health outcomes, particular among highly exposed women (Harville, Xiong, & Buekens, 2010). Stress coping styles has been shown to mediate the relationship between stress and perinatal mental health (Oni, Harville, Xiong, & Buekens, 2012). However, there are limited data on the relationship between perinatal stress exposure and pregnancy complications such as hypertensive disorders of pregnancy or GDM, or medical procedures that could indicate complications, such as induction of labor and cesarean. Additionally, the relationship between stress coping styles and pregnancy complications has not been well described. In this study, we examined the relationship between maternal stress exposure and pregnancy complications among pregnant women exposed to Hurricane Katrina, as well as the impact of stress coping styles on these outcomes.

Callout ²

²Use of planning, acceptance, humor, instrumental support, and venting coping styles were associated with a reduced likelihood of developing gestational diabetes.

Methods

Baseline enrollment into this study comprised 220 women from New Orleans recruited at the Tulane-Lakeside Hospital and 81 from Baton Rouge recruited from Women's Hospital who were pregnant during Hurricane Katrina (August 2005) or became pregnant immediately after the hurricane. Both hospitals serve high and low risk women. Trained research assistants conducted recruitment between January 2006 and June 2007 during antenatal care visits. Women were interviewed and they filled out a questionnaire at the clinic. To be included in the study, New Orleans participants needed to have lived in the New Orleans area before Katrina, be at least 18 years old, and speak English. Baton Rouge women needed to meet the same inclusion criteria, and not to have had a severe exposure to Katrina (defined as being forced to evacuate or having a relative die). The initial study design conceptualized the Baton Rouge cohort as a comparison group, but the two groups ended up being more similar than expected and so are grouped for analysis (Xiong et al., 2010a).

Of the initial cohort, a large proportion of women were excluded from final analysis either due to insufficient information to determine coping strategies (85, 28.3%), missing/inconsistent data on hurricane exposure and reported perceived stress (95, 31.7%), and/or missing/inconsistent data outcome variables (50, 16.6%). The combination of these criteria left 146 women (122 from New Orleans and 24 from Baton Rouge) for analysis. Women included in the sample did not differ from those excluded by age, parity, marital status, or employment (Table 2). Elements of the interview and questionnaire included sociodemographic information, hurricane experience, stress-coping styles, substance use, social support received and provided during hurricane, access to care, and psychosocial risk assessment. The interviews took approximately half an hour, and the questionnaires generally took between 20 minutes and half an hour to fill out. The women's medical records were also reviewed for pregnancy outcomes after delivery.

Outcome measures

The outcomes for this analysis were hypertensive disorders of pregnancy (PIH, which includes gestational hypertension and pre-eclampsia), GDM, cesarean birth, and induction of labor during index pregnancy. Data for the outcome variables were obtained by medical chart abstraction on a dichotomous (Yes/No) scale.

Exposure measures

The hurricane experience scale has been used in previous studies (Ehrlich et al.; Harville, Taylor, Tesfai, Xu, & Buekens, 2011; Xiong et al., 2010b). Experiences included in the hurricane score were feeling that one's life was in danger, the subject or member of her household having illness or injury due to hurricane, walking through flood waters, losing belongings that were expensive to replace, or anything of sentimental value, being without electricity for one week or longer, experiencing the death of someone close or seeing anyone die in the hurricane. The total number of events experienced by each woman represented their hurricane experience, and ranged between 2 to 9. The scale was based on a previous study of Hurricane Andrew (Norris, Perilla, Riad, Kaniasty, & Lavizzo, 1999) and was

associated with poorer mental health and birth outcomes in previous studies (Harville, Xiong, Pridjian, Elkind-Hirsch, & Buekens, 2009; Xiong et al., 2010b).

The 10-item Cohen Perceived Stress Scale (PSS) was used to assess perceived stress. The PSS-10 is a psychological instrument that measures the degree to which situations in someone's life are perceived as stressful. The questions ask respondents how they felt and thought during the last month. Responses range from '0=never', '1=almost never', '2=sometimes', '3=fairly often' to '4= very often'. PSS-10 has good psychometric value, and has been validated in different languages and settings with Cronbach's alpha values between 0.71-0.83 (Andreou et al., 2011; Chaaya, Osman, Naassan, & Mahfoud, 2010; Chou, Avant, Kuo, & Fetzer, 2008; Cohen, Kamarck, & Mermelstein, 1983); and 0.87 for this study.

The 14-items of Carver's Brief COPE were asked in the 28-item coping section of the questionnaire to assess how the women coped with Hurricane Katrina circumstances. The internal reliability of this scale reports Cronbach alpha coefficients ranging from 0.50 to 0.90 (Carver, 1997). For this study, alpha coefficients ranged from 0.82 to 0.86. The coping styles assessed are active coping, planning, positive reframing, acceptance, humor, religion, using emotional support, using instrumental support, self-distraction, denial, venting, substance use, behavioral disengagement and self-blame. Each item ranged from 1 ("I haven't been doing this at all") to 4 ("I've been doing this a lot"). For each of the 14 coping styles, a woman can have a maximum score of 8 (up to 4 on each of the two questions of a coping style). The numbers corresponding to the items selected were summed; women with a score of 2 or less on any coping scale *did not use* that coping style, while those who had a total score greater than 2 on any coping scale *used* that coping style.

Statistical analysis

After excluding women with missing data on the exposure and outcome variables of interest, we described the study population using frequencies and proportions. Next, we performed logistic regression modeling to determine the association between pregnancy complications and exposure to hurricane and reported perceived stress. We then examined how different coping styles predicted complications. Models were adjusted for perceived stress/hurricane experience, time between Hurricane Katrina and interview, maternal age, race, marital status, educational level, parity, employment status, body mass index and social support (measured using the Support Behaviors Inventory from the Perinatal Psychosocial Profile (Brown, 1986)).

Further, we determined whether coping styles interacted with hurricane experience, using models of the coping styles with added interaction terms (hurricane experience*specific coping style), incorporating the above covariates. Finally, we also determined whether the time between Hurricane Katrina and the interview interacted with coping styles or hurricane experience. Due to large number of variables included for this analysis and the small sample size, models were assessed for goodness of fit using Hosmer and Lemeshow Goodness-of-Fit Tests. Model calibration using the Hosmer-Lemeshow goodness-of-fit tests consistently yielded Chi-square P-values >0.05 for all models, indicating acceptable model fit.

All analyses were conducted using SAS 9.2 (SAS Institute, Inc., Cary, North Carolina).

The Institutional Review Boards of Tulane University and the participating hospitals approved the study, and subjects provided written informed consent.

Results

In all, there were 146 women in this analysis. Median age was 26.0 years. Over one-half of the women were White (53.4 %), married (55.5 %), and primiparous (45.2 %). Median education was 14.0 years, and only 3 (2.1%) had less than 9 years of education. Ninety (50.7%) of the women were employed (Table 2). Regarding the exposure and outcome variables, perceived stress score ranged from 0 to 39, with median at 15. Hurricane exposure scores ranged from 2 to 9, with median at 4. Mean gestational age at interview was 27.2 weeks (SD 6.0). Median time between dates of interview and Hurricane Katrina was 8.3 months (ranging from 6.3-22.7 months).

More than one-half of the women had their labor induced (64.4%), 45.9% underwent cesarean, 11.0% developed PIH, and 11.6% developed GDM. We found some association between exposure to hurricane or perceived stress and pregnancy complications among the women studied. Exposure to hurricane stress was significantly associated with higher likelihood to report perceived stress (aOR=1.50; CI=1.34, 1.99; P<0.01). Women who reported exposure to hurricane stress had higher rates for induction of labor (adjusted OR=1.39, CI 1.03-1.86; P=0.03). Those who reported perceived stress had higher rates of PIH (aOR=1.16, CI 1.05-1.30; P<0.01); GDM (aOR=1.13, CI 1.02-1.25; P=0.02) and possibly cesarean birth (aOR=1.07, CI 1.00- 1.14; P=0.06). (Table 3)

Models for the associations of coping styles with pregnancy complications (controlling for hurricane experience in the model) showed that use of planning (aOR=0.51, CI 0.29-0.93, P=0.03), acceptance (aOR=0.57, CI 0.35-0.90, P=0.02), humor (aOR=0.21, CI 0.07-0.70, P=0.01), instrumental support (aOR=0.41, CI 0.20-0.85, P=0.02), and venting (aOR=0.40, CI 0.18-0.91, P=0.03), were protective against GDM. Women who reported using venting coping styles were less likely to have PIH (aOR=0.41, CI 0.18, 0.92, P=0.03). Use of denial coping style was positively associated with GDM (aOR=2.25, CI 1.14, 4.45, P=0.02). Less significant negative associations (P<0.10) were found between use of positive reframing and GDM, and between acceptance coping and PIH.

Use of self-distraction coping style was also positively associated with cesarean but the effect was less significant. (Table 4) We did not find significant effects of the interactions with time since hurricane exposure on any of the pregnancy outcomes (data not shown). The interactions of specific coping styles with hurricane experience were also not statistically significant (data not shown). When reporting perceived stress was substituted for hurricane experience in the model, the relationship between coping styles and pregnancy complications were consistent with those presented in Table 4.

Discussion

In this study, we found a significant positive association between hurricane exposure and frequency of induction of labor. Women who perceived higher levels of stress were also significantly predisposed to PIH, GDM, and cesarean. Certain coping styles seemed to be protective against pregnancy complications. The use of planning, acceptance, humor, instrumental support and venting coping styles were associated with a significantly reduced occurrence of some of the pregnancy complications, while women who used denial coping style were more likely to develop GDM.

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Results of previous work on the effects of stress on pregnancy complications are mixed. Our findings on induction of labor and cesarean are consistent with the findings by Saunders et al. (2006) that women with higher prenatal stress were more likely to have unplanned cesareans through the association between prenatal stress and delivery analgesia, though they did not clearly delineate the role of stress on induction of labor (Saunders et al., 2006). This finding is also consistent with vital statistics research indicating more cesareans after Katrina (Harville, Tran, et al., 2010) and more fetal distress after Hurricane Andrew (Zahran et al., 2010). We found that women who perceived stress were more likely to have PIH, similar to findings by Landsbergis and Hatch (1996) that psychosocial job stressors was associated with gestational hypertension (Landsbergis & Hatch, 1996). Other research has been inconclusive (Nugteren et al., 2012); for instance, a community-based study of 3670 nulliparous pregnant women found that exposure to psychosocial stress did not influence the incidence of pre-eclampsia and gestational hypertension (Vollebregt et al., 2008). It may be that the differences in the timing, types, severity, or acuteness of stress, are responsible for these divergent findings. Our study also showed that women were more likely to develop GDM if they perceived stress, which agrees with Hosler et al. (2011) that exposure to stressful events during pregnancy may be a risk factor for GDM (Hosler et al., 2011). Their study did not, however, focus on disaster-related maternal stress.

We found that the use of planning, acceptance, humor, instrumental support and venting coping styles were associated with a reduced likelihood of developing gestational diabetes. To our knowledge, this specific question has not been addressed before, though a few studies have examined coping and chronic (non-gestational) diabetes. DeCoster et al. (2004) concluded that the use of problem-focused coping was associated with better diabetic control (DeCoster & Cummings, 2004). This definition would include coping styles such as active coping, planning, suppression of competing activities, restraint coping, and seeking of instrumental social support. This study only enrolled 34 participants (male and female), and was not restricted to pregnancy, but the findings were similar to ours. Grey et al. (1997) reported poorer metabolic control among 89 diabetic children who used more avoidance coping (Grey, Lipman, Cameron, & Thurber, 1997). In gestational diabetes, weight gain rather than medication adherence is likely to be a major predictor, (Thompson, Ananth, Jaddoe, Miller, & Williams, 2014; Walsh, McGowan, Mahony, Foley, & McAuliffe, 2014).

³Exposure to disaster-related stress may be associated with pregnancy complications.

However, we performed some additional analysis, which indicated that the coping styles associated with GDM (planning, acceptance, humor, instrumental support, denial and venting) were not associated with weight gain in this dataset. In addition, we had asked women whether their diets had improved, stayed the same, or gotten worse after the hurricane, and found that this was not associated with the coping styles. More detailed study of specific pathways will be necessary in future studies, and future researchers should explore behavioral pathways by which coping styles may have an effect.

Additionally, we found that the use of venting coping style reduced the likelihood of developing PIH, and that the use of denial coping style increased the likelihood of GDM. Given the limited research in these areas, it is hard to compare findings to previous literature. A few works have commented on the negative aspect of denial coping style, but most of these studies looked at its adverse consequence on mental health or its impact on recovery from health challenges (Gonzalez-Freire, Vazquez-Rodriguez, Marcos-Velazquez, & de la Cuesta, 2010; Goossens, Knoppert-van der Klein, & van Achterberg, 2008; Parikh et al., 2007). In a study among people recently diagnosed with diabetes, denial of the disease during the first 5 years was associated with poor glycemic control (Garay-Sevilla, Malacara, Gutiérrez-Roa, & González, 1999). With reference to pregnancy, high use of avoidance coping such as denial in the final trimester was a significant predictor of postnatal depression among 306 women attending a prenatal clinic in South Wales, (Honey, Bennett, & Morgan, 2003) Prenatal diagnosis of congenital heart disease increased maternal stress, anxiety and depression among mothers who used the denial coping style (Rychik et al., 2013). Overall, it seems like the use of denial coping style tends to be unhealthy, but additional work in this area is necessary.

Induction of labor and cesarean are often necessary medically, but are not normally considered ideal, as they are associated with increased costs and morbidity for mother and child (Boyle & Reddy, 2012; Declercq, Sakala, Corry, Applebaum, & Herrlich, 2013). These procedures can be driven both by medical necessity, but also changes in practice patterns. Therefore, the associations we find with induction or cesarean could have several causes: direct biological effects, changes in the interaction between provider and patient (e.g., both sides wanting to avoid unpredictability in the post-disaster environment), or constraints in the practice setting (e.g., practitioners being short-staffed). Vital records data show an increase in cesarean after Hurricane Katrina (Harville, Tran, et al., 2010), despite few changes in low birthweight or preterm birth rates. Some other studies indicate changes in labor characteristics after hurricanes (Currie & Rossin-Slater, 2013; Zahran et al., 2010), but such changes could also indicate variation in the quality of data recording.

Our study is fairly novel in considering the effect of stress on pregnancy complications as well as the effect of coping styles, but the relatively small sample size limited the statistical power of the study. Larger studies would be needed to further test these hypotheses. The women were at different stages of pregnancy during Hurricane Katrina, or became pregnant immediately after the storm, which could possibly increase variability. However, we did not find significant interaction effects of the time between Hurricane Katrina and study interview in our modeling, and women were exposed to post-disaster stress for many months after the storm. We found relatively high rates of pregnancy complications among the

women. This is partly because Lakeside Hospital is a referral clinic for high-risk patients, though it also serves many low-risk women. Our interviews were performed across gestation and although most complications would have been diagnosed after the interview, some may have been diagnosed before, or the woman may have been aware of symptoms which would presage those diagnoses. However, this should not affect the relationship with hurricane experience (which occurred well before the complications) or induction of labor or cesarean (which occurred after the interview). Finally, the large number of coping styles means multiple comparisons with the corresponding possibility of false positives.

We do not have information about the women's previous pregnancy complications. This would be a confounding factor if a woman's history of complications caused her exposure status to differ at a later pregnancy. Disaster exposure is unlikely to be differentially distributed by medical history. We did not find any direct evidence on whether coping style is likely to change based on history of pregnancy complications. Generally, coping is related to personality (Kardum & Krapic, 2001; Watson & Hubbard, 1996) which is a stable trait, and coping styles have been shown to stay fairly constant across time, especially in similar situations (Kirchner, Forns, Amador, & Munoz, 2010; Parkes, 1986). However, some psychological treatments (including for pregnancy complications) do include encouraging changes to coping styles (Poel, Swinkels, & de Vries, 2009). It is possible that history of complications will be a direct cause of changes in coping styles. Women with a history of complications might be less likely to be in denial, but our results are in the opposite direction: denial was associated with an increased risk of complications. Similarly, women with a history of the complications would be more likely to use planning, acceptance, and instrumental support coping styles (as these women would have a better idea of what to expect and do), but we found that these were associated with a reduced risk of pregnancy complications. Overall, therefore, we do not think this would modify our conclusions. It is possible that women with previous complications find later pregnancies more stressful, so that is a possible source of confounding for the relationships seen with perceived stress.

Conclusion

In conclusion, we determined that exposure to disaster-related stress was associated with pregnancy complications in this study. More importantly, we found that use of planning, acceptance, humor, instrumental support, and venting coping styles were associated with reduced pregnancy complications among pregnant women exposed to stress. Additionally, we concluded that use of denial coping style increased the likelihood that a woman would develop GDM. In view of insufficient literature in this field, we encourage further research to explore how coping styles may mitigate or exacerbate the effect of major stressors. We also encourage further research in this area, with particular reference to pregnant women and exposure to disaster-related stress, and increased attention to how positive coping styles can be encouraged or augmented.

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References

- American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes Care*. 2009; 32(Suppl 1):S62–S67.10.2337/dc09-S062 [PubMed: 19118289]
- Andreou E, Alexopoulos EC, Lionis C, Varvogli L, Gnardellis C, Chrousos GP, Darviri C. Perceived Stress Scale: Reliability and validity study in Greece. *International Journal of Environmental Research and Public Health*. 2011; 8:3287–3298.10.3390/ijerph8083287 [PubMed: 21909307]
- Anorlu RI, Iwuala NC, Odum CU. Risk factors for pre-eclampsia in Lagos, Nigeria. *Australian and New Zealand Journal of Obstetrics and Gynaecology*. 2005; 45:278–282.10.1111/j.1479-828X.2005.00411.x [PubMed: 16029292]
- Aspinwall LG, Taylor SE. A stitch in time: Self-regulation and proactive coping. *Psychological Bulletin*. 1997; 121:417–436. [PubMed: 9136643]
- Boyle A, Reddy UM. Epidemiology of cesarean delivery: The scope of the problem. *Seminars in Perinatology*. 2012; 36:308–314.10.1053/j.semperi.2012.04.012 [PubMed: 23009961]
- Brown MA. Social support, stress, and health: A comparison of expectant mothers and fathers. *Nursing Research*. 1986; 35:72–76. [PubMed: 3633508]
- Carver CS. You want to measure coping but your protocol's too long: Consider the brief COPE. *International Journal of Behavioral Medicine*. 1997; 4:92–100.10.1207/s15327558ijbm0401_6 [PubMed: 16250744]
- Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology*. 1989; 56:267–283. [PubMed: 2926629]
- Centers for Disease Control and Prevention. Reproductive health: Pregnancy complications. 2014 Jan 22. Retrieved December 16, 2014, from <http://www.cdc.gov/reproductivehealth/MaternalInfantHealth/PregComplications.htm>
- Chaaya M, Osman H, Naassan G, Mahfoud Z. Validation of the Arabic version of the Cohen Perceived Stress Scale (PSS-10) among pregnant and postpartum women. *BMC Psychiatry*. 2010; 10:111.10.1186/1471-244X-10-111 [PubMed: 21159169]
- Chou FH, Avant KC, Kuo SH, Fetzer SJ. Relationships between nausea and vomiting, perceived stress, social support, pregnancy planning, and psychosocial adaptation in a sample of mothers: A questionnaire survey. *International Journal of Nursing Studies*. 2008; 45:1185–1191.10.1016/j.ijnurstu.2007.08.004 [PubMed: 17905253]
- Clark SL, Belfort MA, Dildy GA, Herbst MA, Meyers JA, Hankins GD. Maternal death in the 21st century: Causes, prevention, and relationship to cesarean delivery. *American Journal of Obstetrics and Gynecology*. 2008; 199:36, e31–35. discussion 91-32 e37-11. 10.1016/j.ajog.2008.03.007 [PubMed: 18455140]
- Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *Journal of Health and Social Behavior*. 1983; 24:385–396. [PubMed: 6668417]
- Currie J, Rossin-Slater M. Weathering the storm: Hurricanes and birth outcomes. *Journal of Health Economics*. 2013; 32:487–503.10.1016/j.jhealeco.2013.01.004 [PubMed: 23500506]
- Declercq, ER.; Sakala, C.; Corry, MP.; Applebaum, S.; Herrlich, A., editors. *Listening to Mothers III: Pregnancy and Birth*. New York: Childbirth Connection; 2013.
- DeCoster, Vaughn; Cummings, Sherry. Coping with type 2 diabetes: Do race and gender matter? *Social Work in Health Care*. 2004; 40:37–53. [PubMed: 15774362]
- Duley L. The global impact of pre-eclampsia and eclampsia. *Seminars in Perinatology*. 2009; 33:130–137.10.1053/j.semperi.2009.02.010 [PubMed: 19464502]
- Ehrlich M, Harville E, Xiong X, Buekens P, Pridjian G, Elkind-Hirsch K. Loss of resources and hurricane experience as predictors of postpartum depression among women in southern Louisiana. *Journal of Women's Health*. 19:877–884.10.1089/jwh.2009.1693
- Folkman S, Lazarus RS. An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior*. 1980; 21:219–239. [PubMed: 7410799]
- Folkman S, Lazarus RS, Gruen RJ, DeLongis A. Appraisal, coping, health status, and psychological symptoms. *Journal of Personality and Social Psychology*. 1986; 50:571–579. [PubMed: 3701593]

- Garay-Sevilla ME, Malacara JM, Gutiérrez-Roa A, González E. Denial of disease in Type 2 diabetes mellitus: Its influence on metabolic control and associated factors. *Diabetic Medicine*. 1999; 16:238–244.10.1046/j.1464-5491.1999.00033.x [PubMed: 10227570]
- Garland E, Gaylord S, Park J. The role of mindfulness in positive reappraisal. *Explore (NY)*. 2009; 5:37–44.10.1016/j.explore.2008.10.001 [PubMed: 19114262]
- Gonzalez-Freire B, Vazquez-Rodriguez I, Marcos-Velazquez P, de la Cuesta CG. Repression and coping styles in asthmatic patients. *Journal of Clinical Psychology in Medical Settings*. 2010; 17:220–229.10.1007/s10880-010-9198-z [PubMed: 20508976]
- Goossens PJ, Knoppert-van der Klein EA, van Achterberg T. Coping styles of outpatients with a bipolar disorder. *Archives of Psychiatric Nursing*. 2008; 22:245–253.10.1016/j.apnu.2007.07.001 [PubMed: 18809117]
- Grey M, Lipman T, Cameron ME, Thurber FW. Coping behaviors at diagnosis and in adjustment one year later in children with diabetes. *Nursing Research*. 1997; 46:312–317. [PubMed: 9422049]
- Harville EW, Savitz DA, Dole N, Herring AH, Thorp JM. Stress questionnaires and stress biomarkers during pregnancy. *Journal of Women's Health*. 2009; 18:1425–1433.
- Harville EW, Taylor CA, Tesfai H, Xu Xiong, Buekens P. Experience of Hurricane Katrina and reported intimate partner violence. *Journal of Interpersonal Violence*. 2011; 26:833–845.10.1177/0886260510365861 [PubMed: 20495099]
- Harville EW, Tran T, Xiong X, Buekens P. Population changes, racial/ethnic disparities, and birth outcomes in Louisiana after Hurricane Katrina. *Disaster Medicine and Public Health Preparedness*. 2010; 4(Suppl 1):S39–45.10.1001/dmp.2010.15 [PubMed: 23105034]
- Harville EW, Xiong X, Pridjian G, Elkind-Hirsch K, Buekens P. Postpartum mental health after Hurricane Katrina: A cohort study. *BMC Pregnancy and Childbirth*. 2009; 9:21.10.1186/1471-2393-9-21 [PubMed: 19505322]
- Harville E, Xiong X, Buekens P. Disasters and perinatal health: A systematic review. *Obstetric and Gynecological Survey*. 2010; 65:713–728.10.1097/OGX.0b013e31820eddbe
- Honey, Kyla L.; Bennett, Paul; Morgan, Michelle. Predicting postnatal depression. *Journal of Affective Disorders*. 2003; 76:201–210. [PubMed: 12943950]
- Hosler AS, Nayak SG, Radigan AM. Stressful events, smoking exposure and other maternal risk factors associated with gestational diabetes mellitus. *Paediatric and Perinatal Epidemiology*. 2011; 25:566–574.10.1111/j.1365-3016.2011.01221.x [PubMed: 21980946]
- Huizink AC, Robles de Medina PG, Mulder EJ, Visser GH, Buitelaar JK. Stress during pregnancy is associated with developmental outcome in infancy. *Journal of Child Psychology and Psychiatry*. 2003; 44:810–818. [PubMed: 12959490]
- Huizink, Anja C.; Robles de Medina, Pascale G.; Mulder, JH.; Visser, Gerard HA.; Buitelaar, Jan K. Coping in normal pregnancy. *Annals of Behavioral Medicine*. 2002; 24:132–140.10.1207/s15324796abm2402_10 [PubMed: 12054318]
- Kardum, Igor; Krapic, Nada. Personality traits, stressful life events, and coping styles in early adolescence. *Personality and Individual Differences*. 2001; 30:503–515.
- Kirchner T, Fornis M, Amador JA, Munoz D. Stability and consistency of coping in adolescence: A longitudinal study. *Psicothema*. 2010; 22:382–388. [PubMed: 20667264]
- Klonoff-Cohen HS, Cross JL, Pieper CF. Job stress and preeclampsia. *Epidemiology*. 1996; 7:245–249. [PubMed: 8728436]
- Landsbergis PA, Hatch MC. Psychosocial work stress and pregnancy-induced hypertension. *Epidemiology*. 1996; 7:346–351. [PubMed: 8793358]
- Lazarus RS. Coping theory and research: Past, present, and future. *Psychosomatic Medicine*. 1993; 55:234–247. [PubMed: 8346332]
- Lazarus, RS.; Folkman, S., editors. *Stress, Appraisal, and Coping*. New York: Springer Publishing Company; 1984.
- Leeners B, Neumaier-Wagner P, Kuse S, Stiller R, Rath W. Emotional stress and the risk to develop hypertensive diseases in pregnancy. *Hypertension in Pregnancy*. 2007; 26:211–226.10.1080/10641950701274870 [PubMed: 17469011]

- Makhseed M, Musini VM, Hassan NA, Saker E. Post-invasion change in the trend of complications and outcome of pregnancy in Maternity Hospital Kuwait from 1981 to 1995. *Medicine, Conflict, and Survival*. 1999; 15:161–170.10.1080/13623699908409451
- Marcoux S, Berube S, Brisson C, Mondor M. Job strain and pregnancy-induced hypertension. *Epidemiology*. 1999; 10:376–382. [PubMed: 10401871]
- Martini J, Knappe S, Beesdo-Baum K, Lieb R, Wittchen HU. Anxiety disorders before birth and self-perceived distress during pregnancy: Associations with maternal depression and obstetric, neonatal and early childhood outcomes. *Early Human Development*. 2010; 86:305–310. doi. 10.1016/j.earlhumdev.2010.04.004 [PubMed: 20547016]
- Messer, Lynne C.; Dole, Nancy; Kaufman, Jay S.; Savitz, David A. Pregnancy Intendedness, Maternal Psychosocial Factors and Preterm Birth. *Maternal and Child Health Journal*. 2005; 9:403–412.10.1007/s10995-005-0021-7 [PubMed: 16249944]
- Norris FH, Perilla JL, Riad JK, Kaniasty K, Lavizzo EA. Stability and change in stress, resources, and psychological morbidity: Who suffers and who recovers: Findings from Hurricane Andrew. *Anxiety, Stress, and Coping*. 1999; 12:363–396.
- North CS, Pfefferbaum B, Narayanan P, Thielman S, McCoy G, Dumont C, Spitznagel EL. Comparison of post-disaster psychiatric disorders after terrorist bombings in Nairobi and Oklahoma City. *British Journal of Psychiatry*. 2005; 186:487–493.10.1192/bjp.186.6.487 [PubMed: 15928359]
- Nugteren JJ, Snijder CA, Hofman A, Jaddoe VW, Steegers EA, Burdorf A. Work-related maternal risk factors and the risk of pregnancy induced hypertension and preeclampsia during pregnancy. The Generation R Study. *PLoS One*. 2012; 7:e39263.10.1371/journal.pone.0039263 [PubMed: 22720087]
- Oni O, Harville EW, Xiong X, Buekens P. Impact of coping styles on post-traumatic stress disorder and depressive symptoms among pregnant women exposed to Hurricane Katrina. *American Journal of Disaster Medicine*. 2012; 7:199–209. [PubMed: 23140063]
- Parikh SV, Velyvis V, Yatham L, Beaulieu S, Cervantes P, Macqueen G, Zaretsky A. Coping styles in prodromes of bipolar mania. *Bipolar Disorder*. 2007; 9:589–595.10.1111/j.1399-5618.2007.00448.x
- Parkes KR. Coping in stressful episodes: The role of individual differences, environmental factors, and situational characteristics. *Journal of Personality and Social Psychology*. 1986; 51:1277–1292. [PubMed: 3806363]
- Poel YH, Swinkels P, de Vries JI. Psychological treatment of women with psychological complaints after pre-eclampsia. *Journal of Psychosomatic Obstetrics and Gynaecology*. 2009; 30:65–72.10.1080/01674820802545990 [PubMed: 19308785]
- Rebello, Fernanda; Da Rocha, Camilla Medeiros Macedo; Cortes, Taísa Rodrigues; Dutra, Carmem LÚcia; Kac, Gilberto. High cesarean prevalence in a national population-based study in Brazil: The role of private practice. *Acta Obstetrica et Gynecologica Scandinavica*. 2010; 89:903–908.10.3109/00016349.2010.484044 [PubMed: 20583936]
- Reed S, Giacobbi PR Jr. The stress and coping responses of certified graduate athletic training students. *Journal of Athletic Training*. 2004; 39:193–200. [PubMed: 15173872]
- Roy-Matton N, Moutquin JM, Brown C, Carrier N, Bell L. The impact of perceived maternal stress and other psychosocial risk factors on pregnancy complications. *Journal of Obstetrics and Gynaecology Canada*. 2011; 33:344–352. [PubMed: 21501539]
- Rychik J, Donaghue DD, Levy S, Fajardo C, Combs J, Zhang X, Diamond GS. Maternal psychological stress after prenatal diagnosis of congenital heart disease. *Journal of Pediatrics*. 2013; 162:302–307. e301.10.1016/j.jpeds.2012.07.023 [PubMed: 22974576]
- Saunders, Tracie A.; Lobel, Marci; Veloso, Christine; Meyer, Bruce A. Prenatal maternal stress is associated with delivery analgesia and unplanned cesareans. *Journal of Psychosomatic Obstetrics & Gynecology*. 2006; 27:141–146.10.1080/01674820500420637 [PubMed: 17214448]
- Seyedfatemi N, Tafreshi M, Hagani H. Experienced stressors and coping strategies among Iranian nursing students. *BMC Nursing*. 2007; 6:11.10.1186/1472-6955-6-11 [PubMed: 17999772]

- Thompson ML, Ananth CV, Jaddoe VW, Miller RS, Williams MA. The association of maternal adult weight trajectory with preeclampsia and gestational diabetes mellitus. *Paediatric and Perinatal Epidemiology*. 2014; 28:287–296.10.1111/ppe.12128 [PubMed: 24842329]
- Vollebregt KC, Van Der Wal MF, Wolf H, Vrijkotte TGM, Boer K, Bonsel GJ. Is psychosocial stress in first ongoing pregnancies associated with pre-eclampsia and gestational hypertension? *BJOG: An International Journal of Obstetrics & Gynaecology*. 2008; 115:607–615.10.1111/j.1471-0528.2008.01665.x [PubMed: 18333942]
- Walsh JM, McGowan CA, Mahony RM, Foley ME, McAuliffe FM. Obstetric and metabolic implications of excessive gestational weight gain in pregnancy. *Obesity*. 2014; 22:1594–1600.10.1002/oby.20753 [PubMed: 24715415]
- Wangel AM, Molin J, Ostman M, Jernstrom H. Emergency cesarean sections can be predicted by markers for stress, worry and sleep disturbances in first-time mothers. *Acta Obstetrica and Gynecologica Scandinavica*. 2011; 90:238–244.10.1111/j.1600-0412.2010.01056.x
- Watson, David; Hubbard, Brock. Adaptational style and dispositional structure: Coping in the context of the five-factor model. *Journal of Personality*. 1996; 64:737–774.
- Wendland, Eliana; Torloni, Maria; Falavigna, Maicon; Trujillo, Janet; Dode, Maria; Campos, Maria; Schmidt, Maria. Gestational diabetes and pregnancy outcomes - a systematic review of the World Health Organization (WHO) and the International Association of Diabetes in Pregnancy Study Groups (IADPSG) diagnostic criteria. *BMC Pregnancy and Childbirth*. 2012; 12:23. [PubMed: 22462760]
- Xiong X, Harville EW, Mattison DR, Elkind-Hirsch K, Pridjian G, Buekens P. Hurricane Katrina experience and the risk of post-traumatic stress disorder and depression among pregnant women. *American Journal of Disaster Medicine*. 2010a; 5:181–187. [PubMed: 20701175]
- Xiong X, Harville EW, Mattison DR, Elkind-Hirsch K, Pridjian G, Buekens P. Hurricane Katrina experience and the risk of post-traumatic stress disorder and depression among pregnant women. *American Journal of Disaster Medicine*. 2010b; 5:181–187. [PubMed: 20701175]
- Young BC, Ecker JL. Fetal macrosomia and shoulder dystocia in women with gestational diabetes: Risks amenable to treatment? *Current Diabetes Reports*. 2013; 13:12–18.10.1007/s11892-012-0338-8 [PubMed: 23076441]
- Zahran S, Snodgrass JG, Peek L, Weiler S. Maternal hurricane exposure and fetal distress risk. *Risk Analysis*. 2010; 30:1590–1601.10.1111/j.1539-6924.2010.01453.x [PubMed: 20626684]

Table 1
Description of Stress Coping Styles

Coping Style	Definition
Active	To actively manage or reduce the effects of critical events that pose a challenge, threat, harm, loss, or benefit to a person (Aspinwall & Taylor, 1997)
Planning	To think about and come up with strategies on how to cope with the problems (Folkman, Lazarus, Gruen, & DeLongis, 1986)
Instrumental social support	To look for advice, assistance or information (Carver et al., 1989)
Emotional social support	To seek emotional comfort by expressing one's feelings in times of need (Reed & Giacobbi, 2004)
Venting	To focus on whatever distress or upset one is experiencing and to ventilate the feelings (Carver et al., 1989; Folkman et al., 1986)
Behavioral disengagement	To withdraw from attempts made at solving a problem; reducing one's effort to deal with the stressor (Reed & Giacobbi, 2004)
Positive reappraisal	To manage distressing emotions rather than focusing on the stressor; to re-construe stressful events as benign, valuable, or beneficial (Garland, Gaylord, & Park, 2009)
Denial	To deny the reality of the event (Carver et al., 1989; Lazarus & Folkman, 1984)
Religion	The tendency to turn to religion in times of stress (Folkman & Lazarus, 1980)
Acceptance	To accept the reality of the stressor, or accept responsibility for the challenge (Folkman et al., 1986)
Substance use	The excessive use of injurious substances such as alcohol, drugs and tobacco (Folkman et al., 1986)
Humor	To joke and keep a sense of humor (Seyedfatemi, Tafreshi, & Hagani, 2007)
Distraction	To attempt to distract oneself from thinking about the goal with which the stressor is interfering (Reed & Giacobbi, 2004)
Self-blame	To criticise oneself for the things that happened (Carver, 1997)

Table 2
Description of Study Population

	Study Group ^{a, c}	Attrition Group ^{b, c}	P-Value
Age (yrs)	N (%)	N (%)	0.27
< 20	14 (9.6)	12 (7.7)	
20 -25	50 (34.3)	25 (16.1)	
26 -30	32 (21.9)	32 (20.7)	
31 -35	30 (20.6)	24 (15.5)	
>35	14 (9.6)	15 (9.6)	
Mean age (SD)	27.2 (6.0)	27.8 (6.3)	0.43
Parity			
Primiparous	66 (45.2)	61 (39.4)	0.72
Multiparous	79 (54.1)	67 (43.2)	
Race			0.77
White	78 (53.4)	52 (33.6)	
Black	56 (38.4)	45 (29.0)	
Other	10 (6.9)	8 (5.2)	
Marital Status			0.58
Married	81 (55.5)	59 (38.1)	
Living with partner	33 (22.6)	17 (11.0)	
Separated or divorced	1 (0.7)	1 (0.01)	
Never married	28 (19.2)	26 (16.8)	
Educational Level (yrs)			0.31
9	3 (2.1)	4 (2.6)	
10 - 12	62 (42.5)	55 (35.5)	
13 - 15	33 (22.6)	16 (10.3)	
>15	46 (31.5)	32 (20.6)	
Employment Status			0.71
Employed	74 (50.7)	59 (38.1)	
Unemployed	61 (41.8)	45 (29.0)	
Social Support Score			0.70
3 - 5	52 (35.6)	29 (18.7)	
6 - 8	59 (40.4)	31 (0.2)	
9 - 12	39 (24.0)	16 (10.3)	
Gestational Diabetes			
Yes	17 (11.6)		
No	129 (88.4)		
Pregnancy-induced hypertension			
Yes	16 (11.0)		
No	130 (89.0)		
Induction of Labor			
Yes	94 (64.4)		

	Study Group ^{a, c}	Attrition Group ^{b, c}	P-Value
No	52 (35.6)		
Mode of Delivery			
Cesarean	67 (45.9)		
Vaginal birth	79 (54.1)		

Note.

^aFrequency distribution based on women with complete data on outcomes and main exposure variables (pregnancy-induced hypertension, gestational diabetes, cesarean, induction of labor, hurricane experience, perceived stress and coping styles).

^bFrequency distribution of the attrition group.

^cProportions may not total up to 100% due to missing data on the variables in both groups.

Table 3
Relationships between Hurricane Exposure, Perceived Stress and Pregnancy Complications

Pregnancy Outcomes	Hurricane Exposure			Perceived Stress		
	aOR ^a	CI	p-value	aOR ^a	CI	p-value
Pregnancy-induced hypertension	1.22	0.81, 1.84	0.33	1.16	1.05, 1.30	<0.01
Gestational diabetes	1.04	0.69, 1.57	0.85	1.13	1.02, 1.25	0.03
Induction of labor	1.39	1.03, 1.86	0.03	1.03	0.97, 1.08	0.39
Cesarean	1.21	0.90, 1.61	0.21	1.07	1.00, 1.14	0.06
Perceived stress ^b	1.50	1.34, 1.99	<0.01			

Note. Model included parity, maternal age, race, marital status, educational level, employment status, social support, and body mass index.

^a aOR=Adjusted increased odds of pregnancy outcome per unit change in hurricane experience/perceived stress.

^b Perceived stress dichotomized at median.

Table 4
Association Between Coping Styles and Pregnancy Complications

Coping Styles	GDM			PIH			Induced Labor			Cesarean		
	aOR ^a	CI	p-value	aOR ^a	CI	p-value	aOR ^a	CI	p-value	aOR ^a	CI	p-value
Active	0.92	0.59, 1.43	0.72	1.64	0.88, 3.04	0.12	1.07	0.84, 1.38	0.57	1.12	0.85, 1.49	0.42
Planning	0.51	0.29, 0.93	0.03	1.04	0.62, 1.75	0.87	0.94	0.73, 1.22	0.65	0.98	0.73, 1.31	0.87
Positive reframing	0.57	0.32, 1.01	0.06	0.99	0.61, 1.61	0.97	0.91	0.70, 1.19	0.50	0.86	0.64, 1.15	0.30
Acceptance	0.57	0.35, 0.90	0.02	0.66	0.41, 1.06	0.08	0.84	0.64, 1.10	0.21	0.80	0.59, 1.07	0.13
Humor	0.21	0.07, 0.70	0.01	0.64	0.35, 1.18	0.15	1.01	0.76, 1.35	0.95	1.13	0.82, 1.56	0.45
Religion	0.93	0.59, 1.48	0.77	1.35	0.84, 2.15	0.21	0.80	0.62, 1.05	0.10	0.78	0.57, 1.05	0.10
Emotional support	0.84	0.50, 1.41	0.51	0.60	0.32, 1.13	0.12	1.13	0.86, 1.48	0.40	1.07	0.80, 1.43	0.64
Instrumental support	0.41	0.20, 0.85	0.02	0.63	0.33, 1.20	0.16	0.86	0.63, 1.16	0.31	1.04	0.75, 1.45	0.80
Self-distraction	0.98	0.58, 1.66	0.94	1.12	0.61, 2.03	0.72	0.99	0.70, 1.38	0.94	1.50	1.00, 2.24	0.05
Denial	2.25	1.14, 4.45	0.02	1.11	0.54, 2.30	0.78	1.49	0.93, 2.40	0.10	1.22	0.77, 1.93	0.41
Venting	0.40	0.18, 0.91	0.03	0.41	0.18, 0.92	0.03	1.05	0.77, 1.43	0.75	1.22	0.86, 1.74	0.27
Substance use	0.05	<i>b</i>	0.99	0.04	<i>b</i>	0.99	0.68	0.30, 1.53	0.35	0.97	0.43, 2.21	0.94
Behavioral disengagement	0.87	0.36, 2.10	0.76	0.44	0.12, 1.55	0.20	0.87	0.50, 1.49	0.61	0.77	0.41, 1.44	0.41
Self-blame	0.80	0.36, 1.78	0.58	0.58	0.21, 1.57	0.28	0.72	0.44, 1.18	0.19	1.16	0.66, 2.04	0.61

Note.

^aModels adjusted for hurricane experience, time between Hurricane Katrina and interview, parity, maternal age, race, marital status, educational level, employment status, social support, and body mass index. aOR=Adjusted odds of pregnancy outcome with use of indicated coping style.

^bData too sparse to get an estimate. GDM=gestational diabetes; PIH=pregnancy-induced hypertension.