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Association of complementary and alternative therapies with mental health outcomes in pregnant women living in a post-disaster recovery environment

Veronica Barcelona de Mendoza, PhD, MSN, RN, APHN-BC¹, Emily Harville, Ph.D¹ [Associate Professor], Jane Savage, Ph.D., MS, RN, CNE, LCCE, FACCE² [Associate Professor], and Gloria Giarratano, Ph.D., APRN, CNS³ [Professor]

Veronica Barcelona de Mendoza: barcelonaveronica@yahoo.com; Emily Harville: eharvill@tulane.edu; Jane Savage: jsavage@loyno.edu; Gloria Giarratano: ggiarr@lsuhsc.edu

¹Tulane University School of Public Health and Tropical Medicine, Department of Epidemiology, 1440 Canal Street, Suite 2000, New Orleans, LA, 70112, Telephone: (504) 988-8609 Fax: (504) 988-1568

¹Tulane University School of Public Health and Tropical Medicine, Department of Epidemiology, 1440 Canal Street, Suite 2000, New Orleans, LA, 70112

²Loyola University New Orleans, School of Nursing, 6363 St. Charles Avenue, Campus Box 45, New Orleans, LA 70118

³Louisiana State University Health Sciences Center School of Nursing, New Orleans, LA, 70112

Abstract

Purpose—The objective of this study was to determine if complementary and alternative medicine (CAM) therapies are associated with mental health in post-disaster environments.

Design—Pregnant women (N=402) were interviewed between 2010-2012 as part of a larger cross-sectional study on hurricane recovery and models of prenatal care.

Methods—Symptoms of depression (Edinburgh Postnatal Depression Screen), prenatal anxiety (Revised prenatal distress questionnaire), post-traumatic stress (PCL-S), and perceived stress (PSS) were examined. Logistic regression was used to adjust for income, race, education, parity and age. The most commonly reported therapies were prayer, music, multivitamins, massage, and aromatherapy.

Findings—Mental illness symptoms were common (30.7% had likely depression, 17.4% had anxiety, and 9.0% had post-traumatic stress). Massage was protective for depression (EDSI>8) (aOR 0.6, 95% CI 0.3-0.9), while use of aromatherapy (aOR 1.9, 95% CI 1.1-3.2) and keeping a journal (aOR 1.9, 95% CI 1.1-3.2) were associated with increased odds of depression. Aromatherapy was associated with symptoms of pregnancy-related anxiety (aOR 2.0, 95% CI 1.1-3.8).

Correspondence to: Veronica Barcelona de Mendoza, barcelonaveronica@yahoo.com.

Supplementary materials. Data are available for further analysis via written request to authors.

Conclusions—Symptoms of mental illness persist after disaster, when untreated. Nurses should consider assessing for CAM utilization in pregnancy as a potentially protective factor for mental health symptoms.

Keywords

Complementary and Alternative Medicine (CAM); depression; disasters; mental health; pregnancy

Introduction

Mental health concerns during pregnancy are widely recognized as a significant public health problem. As many as 12-13% of childbearing women have likely depression (Bennett et al., 2004), 8% of women may experience post-traumatic stress disorder (PTSD) (Seng, Kohn-Wood et al., 2011) and stress and anxiety disorders have also been commonly reported in pregnancy (Fergusson et al., 1996). Major depressive episodes occur in about 12.4% of pregnant women, placing them at higher risk for additional psychiatric disorders (Le Strat et al., 2011). PTSD in pregnancy has adverse health effects for the child in both the immediate neonatal period, manifested as increased rates of low birth weight and preterm birth (Fergusson et al., 1996; Yonkers et al., 2014), as well as potential long-term negative effects of depression and psychosis in pregnancy, which have been shown to interfere with bonding (Wan & Green, 2009).

Women who have a history of trauma are also more likely to be depressed (Le Strat et al., 2011). Women who are exposed to high levels of trauma related to disaster experiences are especially vulnerable to mental illness, and these effects are magnified in women who are Black and low-income (Author, 2009). Disasters, such as Hurricane Katrina, have far-reaching effects on women, including disproportionately more adverse birth outcomes (women with higher exposure to the storm were more likely to have a low birth weight infant (aOR 3.3, 95% CI 1.13-9.89), even after adjusting for multiple confounders (Author, 2008)). Pregnant women may seek low-cost, low-tech interventions to self-treat mental illnesses or feelings of depression. Women with limited access to mental health services may use other, alternative remedies for health. Others described common use of CAM therapies (95%) in a sample of 199 childbearing women in the period immediately following Hurricane Katrina (Author, 2010).

Although Hurricane Katrina hit New Orleans in 2005, poor communities are often the slowest to recover from natural disasters (Davidson et al., 2013; Phillips et al., 2010; Rowel et al., 2012), and mental and physical illnesses persist long after disasters occur (Olteanu et al., 2011). Racial and ethnic minorities are disproportionately affected by disasters due to lower rates of evacuation during events, slower rebuilding of services and homes in affected neighborhoods, and unequal access to financial resources for recovery (Fothergill, et al., 1999). Even women who did not directly experience Hurricane Katrina may still be affected by the incomplete health infrastructure left in its wake. Since that time, however, few studies have examined long-term mental health effects and coping strategies among women, and untreated PTSD persists after disasters (Foa et al, 2006). The shortage of medical and mental health services in post-disaster environments often leads to increased use of other self-care

approaches, and little is known about the how health behaviors of high-risk groups, such as pregnant women, in New Orleans may affect mental health.

The prevalence of complementary and alternative medicine (CAM) therapy use in pregnancy is not well documented. A small cross-sectional study reported a prevalence 68.5% of pregnant women using at least one form of CAM (Strouss et al., 2014). Some of the barriers to determining true prevalence may be providers' lack of assessment and women's reluctance to disclose their use (Hall & Jolly, 2014). In addition, there is a lack of rigorous studies evaluating their efficacy in a systematic manner. Instruments to measure CAM use vary, and numerous types of interventions exist under the umbrella of CAM. Women also differ in their use of CAM therapies, as some may practice CAM at home and others may seek out professionally-based therapies.

Aromatherapy, yoga, acupuncture and massage are some of the more commonly-used therapies in pregnancy, but their effects on mental health have been investigated only to a limited extent. One study was found that looked at aromatherapy with essential oils in pregnancy (Bastard & Tiran, 2006) and no research was found which investigated depression and aromatherapy in pregnancy. Others have suggested that aromatherapy may help with anxiety in pregnancy, but was limited by a very small sample size (n=13) (Igarashi, 2013). Yoga has been associated with decreased symptoms of anxiety and depression in pregnancy (Field et al., 2013; Newham et al., 2014; Satyapriya et al., 2013); however, a Cochrane review found insufficient evidence to make a recommendation for its use, largely due to lack of sufficient details on methodology used and lack of blinding (Marc et al., 2011). A small randomized clinical trial (van der Kolk et al., 2014) found that yoga significantly reduced PTSD symptoms in a sample of non-pregnant women with a history of intimate partner violence. Although one recent meta-analysis concluded that there is high-level evidence to support acupuncture in pregnancy to help treat depression (Snizek & Siddiqui, 2013), another systematic review cited insufficient evidence to support the use of acupuncture to treat depression in pregnancy, largely due to an insufficient sample size in available studies (Dennis & Dowswell, 2013). The effects of acupuncture on PTSD look promising, but have also not yet been well-established (Kim et al., 2013). Massage and yoga have been associated with decreased anxiety and depression in pregnancy (Field et al., 2012; Field et al., 2013; Satyapriya et al., 2013). Prenatal massage has been found to reduce pain, improve depression and anxiety, and also be associated with lower rates of adverse birth outcomes (Collinge et al., 2005; Field et al., 2008; Field et al., 2009). Partner massage has also been shown to be beneficial in reducing maternal prenatal depression in a small trial (Field et al., 2008).

Limited research on CAM utilization in post-disaster environments has been done, yet results are encouraging (Takayama et al., 2012). Where mental health services are lacking or undesirable for cultural reasons, CAM often represents an accessible and affordable way to deal with mental health issues in pregnancy.

Aim/Question

The primary purpose of this study was to investigate the CAM behaviors of pregnant women living in a resource-poor post-Hurricane Katrina environment and their association with symptoms of mental illness.

Method

The GUMBO (Growing Up Moms and Babies in New Orleans) study was a cross-sectional study to determine mental and physical health, stress levels, hurricane-related experiences, social support, access to and experience with prenatal care and self-care strategies during their current pregnancy. Women (N=402) were recruited and enrolled between April 2010 and December 2012. Women were approached for participation in clinic waiting rooms and from prenatal classes by trained data collectors at patients' scheduled appointments. Eligibility requirements included ability to speak either English or Spanish, 18-45 years of age, and an established prenatal care provider (at least 3 visits). Eligibility was restricted to women over 18 in order to recruit women who were heads of household or making decisions about living in a recovery area. Similarly, women under 18 were excluded from participation due to unique challenges and risks for poor mental health in the teen years which are distinctive to that time period. All women in the waiting room during a recruitment session were approached to determine interest and eligibility. Recruitment sites included private prenatal clinics, University hospital-affiliated clinics and prenatal and childbirth classes. Community based and public hospital clinics served racially and economically diverse populations of women, while the private hospital providing prenatal classes consisted of more higher-income, insured women, giving the sample a diversity of location and clientele for recruitment. Informed consent was obtained in the preferred language of the client, and Spanish interviews were conducted by fully bilingual and bicultural data collectors. The study was carried out according to protocol and IRB approval was obtained from affiliated universities and hospitals.

Instruments

CAM utilization was the main exposure of interest. CAM use was measured using a list of thirty-three modalities, representing self-care strategies, based on four accepted domains: mind-body, biologically based, manipulative and body-based, and energy medicine, as well as whole medical systems (National Center for Complementary and Alternative Medicine (NCCAM), 2013). Participants were surveyed on their usage of each modality (never, monthly, weekly, and daily) during her current pregnancy. Women who reported at least monthly use of each CAM were dichotomized as users. The top ten CAM modalities reported by women in the study were included in these analyses.

The main dependent, or outcome variables, were mental illness. Outcome variables were measured using established instruments to assess for depression, pregnancy-specific anxiety, post-traumatic stress disorder and perceived stress. Because these are screening tools, no diagnosis of mental illness can be made. The Edinburgh Postnatal Depression Index (EDSI) has been validated for use in pregnancy in English and Spanish (Alvarado-Esquivel, et al., 2006; Murray & Cox, 1990). The EDSI has 10 items; each item is scored on a four-point

scale (from 0 to 3), with a maximum score of 30 (Eberhard-Gran et al., 2001). A cutoff value of 12 has been recommended to indicate significant postpartum depression (Matthey, 2004), thus this variable was dichotomized with a score of 12 or greater to represent likely depression. “Risk for” depression was pre-specified and defined before data collection as a score of at least eight. Cronbach's alpha has been reported at 0.76 (Adouard et al., 2005) and 0.85 (Adewuya et al., 2006) in two diverse populations. Due to a questionnaire error, one question was omitted and another was repeated. Multiple imputation was used to create a mean value based on the other EDSI questions for these participants (n=89). The reliability was calculated for the Edinburgh scale (using imputed data for EDSI scores), and demonstrated a high coefficient alpha (0.86).

Pregnancy-specific anxiety (PA) was assessed using the Revised Prenatal Distress Questionnaire (Yali & Lobel, 1999). This 17-item instrument explores health concerns related to health of mother and baby, symptoms of pregnancy, medical care and financial issues related to pregnancy. In a diverse sample of pregnant women, responses directly predicted preterm birth and indirectly predicted low birth weight (Lobel et al., 2008). Responses were scored on a Likert scale (0=not at all, 1=somewhat, 2=very much), and dichotomized to >17 indicating the presence of prenatal anxiety. Cronbach's alphas were reported between 0.80 and 0.81 among diverse groups internationally (Alderdice et al., 2012). The internal reliability of this instrument was 0.82 in this sample.

The PCL-S is the post-traumatic checklist, which asks about symptoms related to a stressful experience (PTSD checklist). This 17-item instrument asks about feelings of reliving trauma, numbness and hyperarousal related to a stressful experience. A cutoff of 50 was used to dichotomize this outcome variable, which has been shown to perform well relative to clinical diagnosis of PTSD (Weathers et al., 1993). A Cronbach's alpha of 0.86 has been reported for the PCLS (Ventureyra et al., 2002). The PCL-S had the highest internal consistency of the instruments in this sample, at 0.92.

The Cohen Perceived Stress Scale (PSS) is a 14-item questionnaire designed to measure how much life's events are considered stressful by the respondent (Cohen et al., 1983). This scale has been validated in both English and Spanish, with reliability of 0.84 and 0.81, respectively (Cohen et al., 1983; Remor, 2006). Scores greater than or equal to 25 were considered to indicate high perceived stress. Reliability comparisons between English and Spanish speaking participants in the study are summarized in Supplementary Table 1.

A social support variable was created to measure perceived availability of help during pregnancy. Low social support was defined as answering “no” to four questions from the Prenatal Risk Assessment Monitoring System (PRAMS); including if the woman had someone to loan her money if needed, someone to take care of her if she was sick in bed, someone to drive her to clinic if needed, and someone to talk to about problems. Chi-square tests and Fisher's exact test were used to test for general associations between the ten most frequently used CAM therapies and the mental health outcomes. A priori plans included analyzing the top ten most frequently used CAM therapies, and as such, we did not carry out a mathematical correction of multiple comparisons. Data were modeled using logistic regression for individual CAM therapies (independent variable) with each mental health

outcome (dependent variable), controlling for potential confounders. Confounders were identified via a priori knowledge, and were identified as education, age, parity, income and race. The internal consistency was calculated using Cronbach's coefficient alpha for each of the instruments. All analyses were conducted using SAS 9.3 (Cary, NC).

Results

A detailed description of the study population can be found in Table 1. Study participants were largely low-income, minority women with low levels of education. Women reported racial background of Black (56.8%), White (25.1%), Latina (14.5%) and other (3.51%). Just over half of the sample had less than a high school education or had completed only high school (22.4% and 28.1%, respectively). Most of the women interviewed (53%) had a household income of less than \$15,000 per year, and 45% were between 20-30 years old. More than half of participants were living with a partner or married (57.6%), and most were primiparas (64.3%). The most common mental health symptoms identified in this study was “risk for” depression (EDSI>8), representing 52.9% of women. Nearly a third (30.7%) of the total sample had “likely” depression (EDSI>12).

Participants were asked about CAM utilization and health behaviors. Of the 33 CAM therapies which were assessed, the five most commonly reported were prayer (83.5%), music (74.4%), multivitamins (49.9%), massage (39.4%), and aromatherapy (30.5%). Nearly ten percent of the women interviewed were current smokers; fewer women disclosed current use of alcohol (2%) or drugs (6%). Most women (84.8%) took prenatal vitamins, and about half of the sample (48%) reported eating three or more servings of fruits or vegetables per week. About one quarter of women said they “never exercise”, nearly one half did exercise 1-3 times/week and another third reported doing regular exercise.

Depression

Mental health outcomes and CAM usage are summarized in Tables 2 and 3, which compare women with depression and CAM utilization. Women who used massage were less likely to have EPDS scores >12 (likely depression), but this association was no longer significant after adjusting for education, age, parity, income and race (aOR 0.62, 95% CI 0.37-1.06). Similarly, women who used spiritual practices were significantly less likely before adjustment to have likely depression, but not after adjustment (aOR 0.62, 95% CI 0.31-1.25). When the cut point used for depression was lowered to women with depression (EPDS>8), massage was protective (aOR 0.61, 95% CI 0.38-0.96), while use of aromatherapy (aOR 1.98, 95% CI 1.19- 3.29) and keeping a journal (aOR 1.94, 95% CI 1.15-3.29) were associated with increased odds of depressive symptoms.

Pregnancy-related anxiety

Women who reported using aromatherapy in pregnancy were more than twice as likely to have symptoms of pregnancy-related anxiety (aOR 2.04 95% CI 1.09-3.80). Keeping a journal and prayer were also associated with a higher odds of PA, although these were not statistically significant after adjustment.

Post-Traumatic Stress Disorder

Probable PTSD diagnosis was not significantly associated with CAM use for any of the top ten therapies after adjustment. Examination of crude associations, however, revealed that women who kept a journal had higher odds of PCL score > 50 (aOR 1.93, 95% CI 0.84-4.42).

Perceived Stress Scores

Massage was beneficial for women in terms of reported stress symptoms ($p=0.03$), but this effect was not sustained after adjustment (aOR 0.57, 95% CI 0.31-1.06). Poorer consistency was found for the Perceived Stress Scale in this sample ($\alpha=0.54$) when compared to previous studies.

Implications for practice

Mental illness commonly affects women in pregnancy, thus community mental health and maternity nurses should routinely screen for depression and post-traumatic stress for all women. Special consideration for screening should be given to those with a history of mental illness and those who have experienced a natural disaster, even years after a disaster has taken place. Disasters disproportionately affect urban and minority communities (Davidson, Price, McCauley, & Ruggiero, 2013; Fortherrgill, Maestas, & Darlington, 1999; Phillips, Thomas, Fothergill, & Blinn-Pike, 2010), placing vulnerable pregnant women at even higher risk for adverse health outcomes. Increasing utilization of CAM therapies for prevention of illness and the improvement of prenatal mental health is thus a worthwhile endeavor, whether it be via prenatal education classes for at-home administration or via advocacy for insurance coverage of CAM so that women may receive professional therapies in pregnancy. In addition, strengthening referral networks and mental health services in disaster recovery areas should be a priority for health systems where low-income, diverse communities live.

These efforts for clinical practice should be informed by research and education as well. Research should focus on longitudinal studies of CAM and mental health in pregnancy. Replication of previous studies in high-risk populations would also be beneficial to move the field forward. Inclusion of multiple instruments to measure CAM are also necessary in future studies, as there is no clear gold standard to measure utilization of these therapies. Educational efforts in prenatal settings are also important to ensure safety and appropriateness of CAM use, and should include both patients and providers.

Discussion

This study describes associations of CAM therapies with symptoms of mental illness in pregnant women living in a post-disaster recovery environment. We found use of massage in pregnancy was significantly associated with decreased odds of depressive symptoms, and that both keeping a journal and aromatherapy were associated with increased odds of depressive symptoms in this sample. Conrad reported the results of a small pilot study of aromatherapy's benefits on postpartum women, and found that both inhalation and aromatherapy combined with touch therapy resulted in improvements in anxiety (Conrad & Adams, 2012). They also suggest, however, that aromatherapy alone may require more

frequent or prolonged exposure to see positive change. Another study reported results of a large clinical trial of aromatherapy-massage on cancer patients, also finding positive results (Wilkinson et al., 2007). There were no studies that specifically studied aromatherapy and mental illness symptomatology, and in the present study, the specific type of aromatherapy was not assessed (i.e. essential oils vs. candles, etc.). Other studies have found increased CAM usage to be associated with mental illness symptoms (Bystritsky et al., 2012; Purohit et al., 2013). Aromatherapy combined with massage therapy was often reported in studies; this may be another explanation for the seemingly contradictory findings.

Others have found that episodic journaling, in partnership with other CAM modalities, resulted in reduction of generalized anxiety symptoms (McPherson & McGraw, 2013). Other stress management CAM modalities have been found to be correlated with mental illness symptoms (Kemper et al., 2013) but journaling was not studied specifically. It may be that in the present study, women used journaling as a low-cost method to deal with their anxiety in a medical environment where traditional medical mental health treatment is not available or culturally desirable. Other reasons for the discrepant finding may be the lack of controlled, experimental studies on CAM therapies, lack of sample size on the studies that have been done, as well as the wide range of therapies.

We then conducted further analyses to examine whether professional or lay massage was being used, and if the effects found were a proxy for social support. Women who practiced massage in pregnancy in this study had received this form of comforting touch most often from male partners or the pregnant woman's own mother. Therefore, the observed effects of massage may be due to increased social support. Once we controlled for social support, massage was no longer statistically significant as a protective behavior for depression (EDSI>8) (aOR 0.70, 95% CI 0.44, 1.23). Although the sample size was limited in investigating this association, the direction remains, and suggests that further research in the area of low-tech, partner or family member delivered massage in pregnancy may be warranted.

Although we found that only massage was associated with fewer symptoms of depression (EDSI>8) (aOR 0.6, 95% CI 0.3-0.9), the direction of our findings is consistent with previous work (Collinge et al., 2005; Field et al., 2009) that massage is associated with a decreased odds of mental illness symptomatology in pregnant women. Reasons for this discrepancy may include the fact that there were relatively few women in our study who had poor mental health outcomes and used CAM modalities in pregnancy. The direction of the associations for massage was consistently protective, with adjusted odds ratios ranging from 0.57 for depression (EDSI>8) to 0.75 for PTSD. In a cross-sectional study where hypotheses are not directly tested, and the purpose is descriptive, no conclusions about etiology or causal relationship can be made, but the consistent direction of findings is reassuring.

The association between aromatherapy and increased odds of symptoms of mental illness remained consistent in additional analyses which controlled for social support. Women who used aromatherapy were more than twice as likely to have depressive symptoms (EDSI>8) as women who did not use that CAM therapy (aOR 2.11, 95% CI 1.25-3.55). This effect was also seen for pregnancy-related anxiety, where aromatherapy was significantly associated

with higher anxiety in crude and adjusted models, even where social support was included in the model (aOR 2.09, 95% CI 1.11-3.92). Women who used aromatherapy in pregnancy were significantly more likely to be 25-30 year olds ($p=.01$), have an annual income greater than \$30,000 ($p<.01$), greater than a high school education ($p<.01$), and be Black ($p<.01$), and be married ($p<.05$). Perhaps women with poorer mental health use at-home remedies such as aromatherapy to improve their mood in pregnancy, as this may be seen as a harmless intervention. A small proportion of the sample ($n=26$, 6.3%) reported having taken prescription medications for depression at some time during pregnancy, indicating that perhaps women are under screened and under prescribed medication for depression in pregnancy, or that they use other methods to deal with their symptoms. Use of aromatherapy was not associated with nausea in this sample ($p=.95$)

In addition, the significant relationship between keeping a journal was examined with social support added to the model, and the finding persisted (aOR 1.88, 95% CI 1.10-3.22). Women who kept a journal were more likely to be Black ($p=.01$), to be primiparas ($p=.04$) and to be single or divorced, not living with a partner ($p=.04$).

We did not find significant associations between use of CAM and PTSD or perceived stress in this sample. Little previous work has been done on CAM use and PTSD in pregnancy and existing studies have varied in measurement of CAM modalities and have focused primarily on military veteran study populations. For example, Engle (2014) conducted a study on the effects of acupuncture on military service members with PTSD ($n=55$) and found significantly lower PTSD scores than those who received usual PTSD care (Change in PTSD score= 19.8 ± 13.3 vs. 9.7 ± 12.9 , $P<0.001$) (Engle et al., 2014). A small randomized clinical trial in pregnancy found that women who participated in a stress management program had lower mean stress scores post-intervention than those who received usual care (mean change -3.23 , $p<.05$) (Tragea et al., 2014). Differences between our findings and prior studies were likely due to differences in sample populations and the tools used to measure CAM utilization and the conceptualization of stress in pregnancy.

There are both strengths and limitations to the present study. Strengths include a substantial sample size and good variability in sample race/ethnicity. This is a cross-sectional study, however, so no conclusions about causality or direction of the associations discussed may be drawn. The convenience sampling used in this study design means the sample may be less representative of a larger population; for instance, women who did not seek prenatal care may have been more likely to suffer from mental illness. This was probably not a major source of bias, however, since less than 3% of Louisiana women received late or no prenatal care in 2009 (National Center for Health Statistics, Final Natality Data., 2009). Also, the racial breakdown of women in our study (56.75%) was close to Parish (county) level (53.3%) reports (State of Louisiana Department of Health and Hospitals Birth Data, 2009). The study design may also lend itself to incidence-prevalence bias, as women with more severe mental illness symptoms may be more likely to be included in the study due to longer duration of symptoms. A large number of comparisons were performed, raising the possibility of false positives, thus the study can only provide results that are hypothesis-gathering rather than conclusive. As the majority of study participants were low-income, it is likely that at least some participants who utilized CAM did not seek professional, certified

CAM providers and were limited to self-care via in-home approaches. This highlights the need for future studies in low-income populations where universal access to professional CAM services is lacking, and self-administration of some therapies, such as massage, may prove to be a more feasible approach. Finally, we utilized screening, not diagnostic tools, to identify symptoms of mental illness. Outcomes for CAM utilization may differ for women who have been diagnosed with mental illness in pregnancy.

It should be noted that this study took place 5-7 years after Hurricane Katrina, and eligibility requirements did not require that women had lived in New Orleans when the storm hit. All women in the sample lived in metropolitan New Orleans at the time of the interview, and the research question here did not take hurricane exposure into account as all women were living in a post-disaster recovery environment. This is important as regardless of direct hurricane exposure, women living in many communities still are affected by crime and neighborhood disruption related to rebuilding and recovery. There was a large range of exposure to disaster, however, with 23% reporting no serious exposure to the hurricane and 11% reporting 8 or more serious experiences of the hurricane. Similarly, 37% reported their lives were completely back to normal, while 9% reported their lives were still much disrupted. The PCL was administered without asking women to think of a specific traumatic experience, however, which allows any number of traumas over the life course to be considered.

In summary, we found that women living in a post-disaster recovery environment commonly had symptoms of mental illness, and utilized some CAM therapies in pregnancy. In addition, massage was associated with lower odds of depression. Future qualitative research in this area can build upon these findings to investigate who is providing CAM to women in pregnancy. Prospective studies in pregnancy may also be useful to determine if partner-administered or professional massage can improve women's mental health.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1
Sample characteristics: CAM use, race, education, income, age, parity, marital status, mental health (N=402)*

	N	%
<i>Most frequently used CAM therapies</i>		
Prayer	333	83.46
Music	297	74.44
Multivitamins	199	49.87
Massage	157	39.35
Aromatherapy	122	30.5
Keeping a journal	105	26.38
Progressive Relaxation	98	24.50
Meditation	87	21.75
Dance	75	18.84
Spiritual Practices	73	18.39
<i>Health Behaviors</i>		
Current smoker	38	9.52
Currently drink alcohol	8	2.01
Used illicit drugs during pregnancy	24	6.02
Takes vitamins 4 or more times/wk	399	84.75
Eats fruits/veg 3 or more times/wk	191	47.99
Never exercise	97	24.25
Exercise 1-4 days/wk	188	47.00
Exercise five or more days/wk	115	28.75
<i>Race</i>		
Black	227	56.75
White	100	25.06
Latina	58	14.54
All Other	13	3.51
<i>Education</i>		
Less than HS	89	22.36
HS	112	28.14
Greater than HS	197	49.50
<i>Income</i>		
Less than \$15,000/yr	195	52.00
\$15,000-29,000	76	20.27
\$30,000 or more	104	27.73
<i>Age</i>		
20 years or less	62	15.50
20-25	119	29.75
25-30	117	29.25
>30	102	25.50

	N	%
<i>Most frequently used CAM therapies</i>		
<i>Parity</i>		
Multipara	156	39.59
Primipara	238	60.41
<i>Marital Status</i>		
Single	168	42.42
Living with a partner/Married	228	57.58
<i>Mental Health</i>		
Likely depression (>12)	123	30.67
At risk for depression (>8)	212	52.87
PCL (>50 indicates PTSD dx)	35	8.75
Pregnancy-related Anxiety (>17)	70	17.41
High Perceived Stress Score (>=25)	71	17.66

* Sample sizes may not add up to 402 due to missing data.

Table 2
Frequencies and adjusted odds of depressive symptoms by CAM modality

		Participants using CAM (N, %)		Participants not using CAM (N, %)		* Adjusted odds ratio	95% Confidence Interval	p-value
Likely depression (EDSI>12)								
CAM modality								
	Prayer	107	26.82	14	3.51	1.49	0.70-3.19	0.30
	Music	91	22.81	31	7.77	0.87	0.50-1.54	0.64
	Multivitamins	53	13.28	69	17.29	0.86	0.52-1.42	0.55
	Massage	37	9.27	85	21.30	0.62	0.37-1.06	0.08
	Aromatherapy	36	9.00	86	21.50	1.41	0.81-2.45	0.22
	Keeping a journal	39	9.80	83	20.85	1.38	0.79-2.43	0.26
	Progressive Relaxation	30	7.5	92	23.00	1.01	0.56-1.82	0.98
	Meditation	31	7.75	91	22.75	1.68	0.93-3.02	0.09
	Dance	25	6.28	96	24.12	0.98	0.52-1.87	0.96
	Spiritual Practices	14	3.53	105	26.45	0.62	0.31-1.25	0.18
Risk for depression (EDSI>8)								
CAM modality								
	Prayer	179	44.86	31	7.77	1.13	0.61-2.08	0.71
	Music	156	39.10	54	13.53	0.91	0.55-1.50	0.71
	Multivitamins	99	24.81	112	28.07	0.85	0.54-1.33	0.47
	Massage	70	17.54	141	35.34	0.61	0.38-0.96	0.03
	Aromatherapy	69	17.25	142	35.50	1.98	1.19-3.29	<.01
	Keeping a journal	68	17.09	143	35.93	1.94	1.15-3.29	0.01
	Progressive Relaxation	55	13.75	156	39.00	1.49	0.88-2.53	0.14
	Meditation	51	12.75	160	40.00	1.55	0.90-2.67	0.11
	Dance	45	11.31	165	41.46	1.25	0.70-2.21	0.46
	Spiritual Practices	35	0.82	173	43.58	0.99	0.57-1.75	0.98

* Adjusted for education, age, parity, income and race

Table 3
PTSD, Pregnancy-related Anxiety and Perceived Stress by CAM utilization

	Participants using CAM (N, %)		Participants who did not use CAM (N, %)		* Adjusted odds ratio	95% Confidence Interval	p-value
PTSD (PCL>50)							
Prayer	31	7.81	3	0.76	1.47	0.40-5.38	0.56
Music	28	7.05	6	1.51	1.68	0.61-4.67	0.32
Multivitamins	15	3.78	19	4.79	0.88	0.39-1.98	0.76
Massage	12	3.02	22	5.54	0.75	0.32-1.72	0.49
Aromatherapy	10	2.51	24	6.03	1.39	0.59-3.28	0.46
Keeping a journal	14	3.54	20	5.05	1.93	0.84-4.42	0.12
Progressive Relaxation	9	2.26	25	6.28	0.88	0.34-2.33	0.80
Meditation	10	2.51	24	6.03	1.58	0.64-3.90	0.32
Dance	6	1.52	28	7.07	0.83	0.30-2.30	0.72
Spiritual Practices	6	1.52	28	7.09	1.14	0.40-3.23	0.81
Pregnancy-related anxiety (rPDQ>17)							
Prayer	65	16.29	5	1.25	2.94	0.96-9.03	0.06
Music	55	13.78	15	3.76	1.06	0.53-2.09	0.87
Multivitamins	39	9.77	31	7.77	1.89	1.03-3.45	0.04
Massage	24	6.02	46	11.53	0.69	0.37-1.29	0.24
Aromatherapy	29	7.25	41	10.25	2.04	1.09-3.80	0.02
Keeping a journal	28	7.04	42	10.55	1.47	0.79-2.73	0.23
Progressive Relaxation	13	3.25	57	14.25	0.56	0.26-1.19	0.13
Meditation	17	4.25	53	13.25	1.18	0.60-2.35	0.63
Dance	17	4.27	52	13.07	1.62	0.82-3.21	0.17
Spiritual Practices	13	3.27	56	14.11	1.05	0.49-2.24	0.90
High Perceived Stress (PSS>25)							
Prayer	63	15.79	7	1.75	1.53	0.62-3.78	0.36
Music	55	13.78	16	4.01	1.11	0.57-2.19	0.76
Multivitamins	33	8.27	38	9.52	1.19	0.66-2.15	0.55
Massage	20	5.01	51	21.07	0.57	0.30-1.06	0.07
Aromatherapy	20	5.00	51	12.75	1.08	0.57-2.05	0.82

	Participants using CAM (N, %)		Participants who did not use CAM (N, %)		* Adjusted odds ratio	95% Confidence Interval	p-value
Keeping a journal	22	5.53	48	12.06	1.15	0.61-2.16	0.68
Progressive Relaxation	16	4.00	55	13.75	0.72	0.35-1.46	0.36
Meditation	15	3.75	56	14.00	1.07	0.54-2.11	0.85
Dance	13	3.27	58	14.57	0.82	0.39-1.73	0.61
Spiritual Practices	8	2.02	61	15.37	0.68	0.30-1.55	0.36

* Adjusted for education, age, parity, income and race