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Perceptions, Uses of, and Interests in Complementary Health Care Approaches in Depressed Pregnant Women: The PAW Survey

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Abstract

Depression affects up to 23% of pregnant women and is associated with adverse physical/mental health outcomes for both the mother and baby. Depressed pregnant women may be more likely to engage in unhealthy lifestyle behaviors that contribute to an increased risk for chronic disease. Little is known regarding depressed pregnant women's perceptions, uses of, and interests in complementary health approaches. Study participants (mean age 28.7 $\pm$ 6.8; n = 1032) included pregnant women $\geq$8 weeks gestation who responded to a survey assessing physical and mental health and wellness practices. Of those completing the survey, depressed pregnant women (n = 272) had significantly higher levels of anxiety ($P < .001$) and stress ($P < .001$) and had poorer sleep quality ($P < .001$), mindfulness ($P < .001$), and social support ($P < .001$) compared to nondepressed pregnant women (n = 760). A majority (84%) of depressed pregnant women would consider using a complementary health approach for weight and/or stress management during pregnancy, and more than 50% were interested in yoga.

Keywords

complementary and alternative medicine, depression, pregnancy

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Depression is the most common mental health disorder during pregnancy[1] such that 14% to 23% of pregnant women will experience depressive symptoms at some point during their pregnancy.[2] Sadly, depression and other mental health distress (eg, stress, anxiety) can often go unrecognized in pregnancy due to the overlapping symptoms similar to the physical and mental changes during pregnancy (eg, increased food consumption, weight gain, insomnia, worsened mood, fatigue), resulting in high rates of untreated and/or undertreated depression.[2,3] Studies report less than half of depressed pregnant women are identified and many fail to receive treatment for depressive symptoms,[4-6] partially due to stigma[7] and concerns about the safety of treatment (ie, medications) during pregnancy.[2] Furthermore, 50% to 62% of women who are not treated for depression during pregnancy continue to suffer from depression in the postpartum period,[8] and symptoms may last for months to years after the birth of the baby.[9] A 2014 report from the *Harvard Review of Psychiatry* suggested that 30% of women diagnosed with postpartum depression were still depressed up to 3 years after delivery.[10]

The presence of depression contributes to negative health implications for both the mother and fetus. The impact of depressive symptoms on the mother may include, but are not limited to, less optimal maternal-fetal attachment,[1] increased pregnancy complaints (eg, pain, nausea, dizziness, gastrointestinal symptoms, discomfort), preeclampsia, cesarean section, and even suicide.[1] For the fetus and/or child negative implications may include, but are not limited to, low birth weight, preterm birth, elevated fetal activity, difficult temperament (eg, frequent crying, irritability), attention deficit hyperactivity disorder,[1] elevated cortisol at birth, irregular sleep patterns, delayed cognitive and linguistic skills, and impaired emotional development.[3,8] These behavioral, developmental, and mental deficits among offspring may persist throughout childhood and adolescence.[11-13]

Pregnant women experiencing depressive symptoms are at risk for excessive gestational weight gain (GWG)[14,15] and are more likely to experience comorbid mental health problems

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such as stress and anxiety.[16] Depressed pregnant women may also be more likely to engage in unhealthy lifestyle behaviors[3,8] such as poor sleep habits, self-care and nutrition,[8,17] and less physical activity,[18] all of which increase risk for chronic disease (eg, diabetes, obesity, cardiovascular disease)[19] and long-term negative health implications. Recent literature suggests that pregnant women with limited social support are at high risk for depression,[20] and limited social support during pregnancy is predictive of higher GWG and postpartum depression.[15,21] In addition, the link between depression and poor sleep quality has been well documented in nonpregnant populations; however, the relationship between sleep quality and depression during pregnancy is less understood as irregular sleep patterns are common during pregnancy due to changes in hormones, growth of the fetus, and frequent urination.[22,23] Because both depression and pregnancy both pose challenges with sleep quality, depressed pregnant women are more likely to suffer from increased sleep disturbances, which may lead to immune system disruption and increased inflammatory markers that contribute to a substantial increased risk for adverse pregnancy outcomes.[15] Depression during pregnancy can affect the mother's ability to function and/or participate in healthy lifestyle behaviors.[8] An understanding of how these lifestyle behaviors are affected in depressed pregnant women may aid health care providers (HCPs; eg, obstetricians, midwives) in providing optimal prenatal care as well as determining better strategies to improve healthy lifestyle behaviors in depressed pregnant women.

Despite the negative health implications, many HCPs do not routinely assess or screen for depressive symptoms during pregnancy.[24] In a national survey by Dietrich and colleagues, only 9% to 12% of obstetricians and gynecologists routinely screened for depressive symptoms.[25] Similarly, a survey by Leiferman and colleagues found that even though 90% of HCPs thought it was their responsibility to recognize maternal depression only 60% assessed depression in their pregnant patients.[26] These data highlight that many pregnant women with depression go untreated, increasing their risk of the aforementioned maternal and fetal negative health implications.

Depression during pregnancy is commonly treated by individual/group psychotherapy, medications (eg, psychotropics, serotonin reuptake inhibitors), or a combination thereof.[27] However, women report cost, transportation, child care, stigma,[7,28,29] and fear of adverse reproductive outcomes as barriers to current treatment options.[29] Data from the 2005 to 2009 National Surveys on Drug Use and Health found 26.3% of pregnant women report stigma concerns as a treatment barrier to depression.[24] Goodman investigated pregnant women's attitudes, preferences, and perceived barriers to treatment for maternal depression and found that 42% of pregnant women felt that they would be embarrassed if their friends knew they received professional help for mental health problems.[7] Additionally, 66% of pregnant women report the use of psychotropic medications (ie, medication for mental health disorders that are capable of effecting the mind, emotions, and behavior)[30] to be unacceptable during pregnancy[28,31-34] and desire nonpharmacological alternatives.[35-38] Findings in a review by Bonari and colleagues suggested that pregnant women were reluctant to take psychotropic medications and those who used them often felt apprehensive (eg, anxious, guilty) and preferred other natural treatments such as herbal remedies.[34]

Of late, complementary health care approaches have been increasing in popularity for the treatment of mental health disorders (eg, depression, anxiety)[39] in nonpregnant populations due to their nonpharmacologic nature.[39,40] Complementary health care approaches can be defined as a natural product (eg, herbs) or mind-body practice (eg, yoga, meditation, Tai Chi, Qigong), developed outside of mainstream Western (ie, conventional) medicine to improve health and wellness.[41] Complementary health care approaches have been used in clinical practice to improve chronic disease symptomology including those with diabetes,[42] heart disease,[43] and cancer.[44] Studies suggest that complementary health care approaches (ie, mind-body practices) may stimulate relaxation, reduce stress-signaling hormones, and increase dopamine levels, which play a role in controlling emotions, mood, and anxiety.[45] Practices such as yoga and meditation have been documented to be desirable[46] and improves somatic complaints (ie, pain) of depressed pregnant women, which may improve sleep, as pain is a highly cited reason for sleep disruption during pregnancy.[47] Recent research investigating the effects of yoga to reduce depressive symptoms in depressed pregnant women have reported that yoga is a safe, feasible, and an acceptable approach that may have advantages over standard depression treatment (eg, medications).[48-50] Complementary health care approaches cultivate mindfulness (ie, paying attention in a particular way; on purpose, in the present moment, and nonjudgmentally), a skill that encourages emotion regulation[51] thereby reducing depressive symptoms.[52] Additionally, mindfulness may facilitate positive social interactions and reduce social conflict, which may increase levels of social support in both the peri- and postpartum periods.[20] The benefits of mindfulness extend into the postpartum period and may increase a mothers' self-efficacy and self-compassion, improve mental health distress, and may even have an indirect positive effect on child development.[53] Therefore, complementary health care approaches may be an appropriate strategy to improve depressive symptoms in pregnant women. However, the perceptions, uses of, and interests in complementary health care approaches during pregnancy are less understood, and research in this area is still in its infancy.

Considering the negative implications for both the mother and fetus associated with depression during pregnancy, the limitations to identifying and treating depression during pregnancy, and the lack of research in this area, there is a need to explore the perceptions, uses of, and interests in complementary health care approaches in depressed pregnant women. The purpose of this study was to (1) describe the differences in mental health (ie, stress, anxiety) and lifestyle factors (ie, physical activity, diet, sleep, social support, mindfulness) of depressed pregnant women as compared to nondepressed pregnant women and (2) describe the perceptions, uses of, and

interests in complementary health care approaches in depressed and nondepressed pregnant women.

Methods

The institutional review board of a large university in the southwestern United States approved this study.

Participant Selection

Women were included in the study if they were (1) currently pregnant (≥8 weeks gestation), (2) 18 years and older, (3) a US resident, and (4) able to read and write in English.

Procedures

This was a descriptive, cross-sectional study using a purposive nonprobabilistic sample. Research staff contacted organizations (eg, mother and baby retail stores, hospitals, pregnancy websites) and asked them to advertise the study by posting provided recruitment information (eg, flyers, blurbs) to their social media sites and/or websites, emailing listservs, or by displaying flyers at their location. Local and national organizations agreeing to advertise for the study were sent recruitment information via email. Recruitment for the study occurred between April and June 2015 locally and nationally via social media (eg, Facebook, Twitter), listservs, and websites that cater to women who are pregnant.

Women who were interested in participating were asked to complete an online survey that assessed their general physical and mental health during pregnancy as well as their perceptions, uses of, and interests in complementary health care approaches. After women were confirmed eligible to participate, they were informed of how the data would be used, confidentiality of their responses, and that completion of the survey indicated their consent to be in the study. Women were also told that they were free to choose no as a response or skip questions. The online survey was labeled the Pregnancy and Wellness Survey (PAWS) and was implemented using Qualtrics (Provo, UT). The PAWS took women approximately 30 minutes to complete. Participants who completed the PAWS were offered a $10 Target gift card to compensate for their time participating in the study (limited to the first 350 due to funding). The remaining participants were entered into a drawing to win one Jawbone UP Band or Fitbit Flex (winner's choice) as compensation for their time.

Survey

The PAWS consisted of 2 parts: (1) multiple reliable and valid scales to describe general physical health (eg, amount of GWG in each trimester), lifestyle factors (eg, physical activity, diet, sleep, social support, mindfulness), and maternal mental health (ie, stress, anxiety, depression) and (2) investigator-developed questions to identify the wellness practices (ie, perceptions, uses of, interests in complementary health care approaches) of pregnant women. Demographics were collected at the end of the survey.

PAWS Part 1

Pregnancy Risk Assessment Monitoring System (PRAMS). To determine general physical health, the PRAMS Phase 6 Core Questionnaire[54] was modified and general health questions related to pregnancy were asked, prepregnancy body mass index was calculated using self-reported prepregnancy height and weight, and total GWG was reported in each trimester. Current physical activity behaviors (eg, Are you currently participating in regular exercise? What kind of exercise are you currently participating in?) throughout pregnancy and a general nutrition question (eg, What kind of diet best describes how you are currently eating?) were asked to determine physical activity and dietary habits of pregnant women.

Pittsburgh Sleep Quality Index (PSQI). Sleep quality was assessed using the PSQI,[55] a 19-item questionnaire. Previous studies have reported Cronbach's $\alpha = .83$, and the value in the present study was $\alpha = .73$. Seven component scores are produced to calculate a final global score ranging from 0 to 21. Higher global PSQI scores indicate worse sleep quality.

Modified Medical Outcome Study–Social Support Survey (mMOS-SS). The 8-item mMOS-SS was used to determine available social support resources.[56] Compared to the original 19-item MOS-SS, the mMOS-SS has similar internal consistency with studies reporting $\alpha =$ .80 to .87 and good construct validity. Comparatively, the present study demonstrated a Cronbach's $\alpha = .93$. Scores range from 0 to 100, with higher scores indicating more support.

Mindful Attention Awareness Scale (MAAS). The MAAS[57] includes 15 items to measures the extent to which individuals are able to maintain awareness of present-moment experience. The MAAS is a valid and reliable measure with good internal consistency ($\alpha = .80$-.87). Our sample produced a Cronbach's $\alpha = .93$. Higher scores reflect higher levels of mindfulness.

Perceived Stress Scale (PSS). The PSS[58] includes 10 items that measure the degree of self-appraised stress in one's life within the past month. The PSS is a reliable and valid measure that has demonstrated Cronbach's $\alpha = .84$ and good construct validity in pregnant women.[59] Comparatively, our sample's Cronbach's α was .90. Higher scores indicate higher levels of perceived stress.

State Trait Anxiety Inventory-Short Form (STAI-S). The STAI-S is a 6-item scale used to determine levels of state anxiety and produces scores similar to those obtained using the 20-item STAI state scale.[60] To mitigate participant burden, researchers implemented the 6-item STAI-S (compared to the original 40-item STAI). There is currently no short form for trait anxiety. The STAI-S has been reported to be reliable and valid measure with good internal consistency ($\alpha = .82$) and concurrent validity. Comparatively, this study reported Cronbach's α of .85. Scores range from 20 to 80, with higher scores indicating higher levels of anxiety.

Edinburgh Postnatal Depression Scale (EPDS). The EPDS is a 10-item scale used to assess participants at risk for perinatal depression[61] and is a reliable ($\alpha = .87$) and valid tool. For our current study, Cronbach's $\alpha = .87$. EPDS scores range from 0 to 30, with scores of 12 or greater indicating probable depression. For this study, a cutoff score of 12 was used in data analysis. For convenience of writing this article, those scoring 12 or greater were referred to as depressed and are not representative of a clinical diagnosis for depression.

PAWS Part 2

Wellness Practices. A 19-item survey was developed to assess participants' perceptions, uses of, and interests in complementary health care approaches (eg, yoga, meditation, Tai Chi, Qigong).[41] Questions were yes/no, Likert-type scale items with ordinal answers, multiple choice, open-ended, and check all that apply. Example questions include, ''Have you ever participated in complementary health care approaches during pregnancy?'' ''What benefits do you like about using complementary health care approaches?'' ''Would you ever consider participating in complementary health care approaches to health care during pregnancy?'' ''What kinds of complementary health care approaches would you be interested in using during pregnancy?'' The list of complementary health care approaches included yoga, meditation, mindfulness, Qigong, acupuncture, chiropractic, naturopathy, massage, aruveyda, Tai Chi, Chinese medicine, homeopathy, biofeedback, prayer, shamanism, and energy healing (eg, reiki), and participants were asked to select whether or not they used an complementary health care approach in a previous pregnancy, when they were not pregnant, and/or if they were currently using (see Table 3).

Statistical Analysis

Data were entered into the Statistical Package for Social Sciences (SPSS) version 22.0 for analysis. Descriptive statistics (eg, mean $\pm$ SD, frequencies, and percentages) were used to describe the demographic characteristics, mental health, and lifestyle factors of the pregnant women. Independent *t* tests were conducted to examine mean differences in maternal mental health scores and lifestyle factors between depressed and nondepressed pregnant women. Cohens *d* was used to determine effect size, and values of .2, .5, and .8 indicated small, moderate, and large effect size, respectively.[62] A P value $\leq .05$ was considered statistically significant.

Results

Baseline Demographics and Characteristics

Table 1 illustrates demographics and characteristics of survey respondents (n = 1032). Overall, participants were 28.7 $\pm$ 6.8 years and primarily Caucasian (81.9%). A majority of the sample was married (78.7%), made more than $50 000 (57.1%), and had a college degree (36.7%). Approximately 60% of participants were in their third trimester (ie, $\geq$27 weeks gestation). Just over 26% (n = 272) of women screened positive for depression (eg, EPDS $\geq$12), but when asked if they had been clinically diagnosed with and currently suffering from depression only 21% said yes (n = 56). Eight percent of depressed pregnant women reported asking for help for depression from a doctor, nurse, or other health care professional; 23% were currently receiving counseling or therapy for depression; and 5.9% were currently taking medication for depression. About 46% of pregnant women reported meeting physical activity recommendations ($\geq$150 min/week)[63]; 36% (n = 95) of depressed pregnant women and 49.4% of nondepressed pregnant women. The majority of women reported a normal prepregnancy body mass index (40.2%), but a large amount was overweight (22.3%) or obese (29.2%).

Lifestyle Factors

Independent *t* test results indicated that depressed pregnant women had significantly greater mean scores for anxiety (mean [M] = 48.6, standard deviation [SD] $\pm$ 10.65), $t(1020) = -20.6$, $P < .001$; stress (M = 21.47, SD $\pm$ 5.34), $t(534.5) = -23.3$, $P < .001$; and sleep (M = 9.01, SD $\pm$ 3.21), $t(1029) = -8.3$, $P < .001$, indicating higher levels of anxiety, stress, and worse sleep quality when compared to mean scores in nondepressed women at M = 33.11, SD $\pm$ 10.61; M = 12.23, SD $\pm$ 6.12; M = 7.1, SD $\pm$ 3.26, respectively (see Table 2). Depressed pregnant women also had lower mean scores for social support (M = 59.18, SD $\pm$ 23.06), $t(428.4) = 12.4$, $P < .001$, and mindfulness (M = 3.43, SD $\pm$ 0.83), $t(492.1) = 16.1$, $P < .001$, indicating less available social support resources and lower levels of mindfulness when compared to mean scores in nondepressed pregnant women at M = 79.15, SD $\pm$ 20.75, and M = 4.43, SD $\pm$ 0.91, respectively (see Table 2).

Perceptions, Uses of, and Interests in Complementary Health Care Approaches

Women were asked whether or not they had ever used a complementary health care health care approach (n = 984), and follow-up questions were asked based on their answer (ie, yes/no). The findings presented below represent data gathered from the overall sample (n = 984) as well as the sample of depressed (n = 261) and nondepressed (n = 723) pregnant women (see Table 3).

Thirty-three percent (n = 329) of the overall sample of pregnant women reported use of a complementary health care health care approach. Just over 59% of pregnant women had thought of using complementary health care approaches to manage their weight or stress, 41% had never thought of using complementary health care approaches to manage weight or stress, and 76% of women would consider using complementary health care approaches to manage their weight or stress during pregnancy. A majority of pregnant women (69%) were interested in using yoga to manage their stress during pregnancy. Of those who had used a complementary health care health care approach (n = 329), the top 5 most popular types were prayer (44%), yoga (36%), massage (32%), meditation (26%), and chiropractic care (24%). Most pregnant women who engaged in some sort of mind-body practice (ie, yoga, meditation, Tai Chi, Qigong; 76%) reported using a meditative state (ie, focusing on breath, acknowledging the present moment). Relaxation (79%) was the top reason for using complementary health care approaches, and the top benefit for use was stress reduction (68%). Most pregnant women (89%) felt that complementary health care approaches somewhat or very much helped improve their condition. Approximately 11% of pregnant women were using complementary health care approaches as an alternative (ie, instead of) to conventional health care. Of those who reported never using a complementary health care health care approach (n = 655), a majority

Table 1. Demographics and Characteristics of Survey Respondents (N = 1032) by Depression Status.

	Nondepressed, n (%)	Depressed, n (%)	Overall, n (%)
n	760 (73.64)	272 (26.4)	1,032 (100)
Age (M ± SD)	28.8 ± 7.4	28.4 ± 4.9	28.72 ± 6.8
Race (n = 933)			
Caucasian	554 (81.0)	210 (84.3)	764 (81.9)
African American	45 (6.6)	15 (6.0)	60 (6.4)
Asian or Pacific Islander	27 (3.9)	7 (2.8)	34 (3.6)
American Indian	1 (0.1)	1 (0.4)	2 (0.3)
Two or more races	27 (3.9)	11 (4.4)	38 (4.1)
Other	30 (4.4)	5 (2.0)	35 (3.8)
Hispanic/Latino (n = 935)			
Yes	81 (11.8)	27 (10.8)	108 (11.6)
No	604 (88.2)	223 (89.2)	827 (88.4)
Marital status (n = 940)			
Single (never married)	117 (17.0)	56 (22.2)	173 (18.4)
Divorced/separated/widowed	14 (2.0)	13 (5.2)	27 (2.9)
Married	557 (81)	183 (72.6)	740 (78.7)
Income (n = 938)			
<$10 000	40 (5.8)	15 (6.0)	55 (5.9)
$10 000-19 999	55 (8.0)	26 (10.3)	81 (8.6)
$20 000-34 999	87 (12.7)	40 (15.9)	127 (13.5)
$35 000-49 999	109 (15.9)	30 (11.9)	139 (14.8)
>$50 000	395 (57.6)	141 (56.0)	536 (57.1)
Education (n = 939)			
Less than 12 years	17 (2.5)	4 (1.6)	21 (2.2)
High school/GED	77 (11.2)	27 (10.7)	104 (11.1)
Some college	214 (31.1)	68 (27.0)	282 (30.0)
College degree	231 (33.6)	114 (45.2)	345 (36.7)
Beyond college	148 (21.5)	39 (15.5)	187 (19.9)
Current trimester (n = 1032)			
First (0-13 weeks)	50 (6.6)	21 (7.7)	71 (6.9)
Second (14-26 weeks)	237 (31.2)	104 (38.2)	341 (33.0)
Third (27+ weeks)	473 (62.2)	147 (54.0)	620 (60.1)
Prepregnancy BMI (n = 1032)			
Underweight	22 (2.9)	47 (17.3)	69 (6.7)
Normal	313 (41.2)	102 (37.5)	415 (40.2)
Overweight	184 (24.2)	46 (16.9)	230 (22.3)
Obese	229 (30.1)	72 (26.5)	301 (29.2)
Currently exercising regularly (n = 983)			
Yes	358 (49.4)	95 (36.7)	453 (46.1)
No	366 (50.6)	164 (63.3)	530 (53.9)
Counseling/therapy for depression (n = 99)			
Yes	13 (30.2)	13 (23.2)	26 (26.3)
No	30 (69.8)	43 (76.8)	73 (73.7)
Ask for help for depression (n = 99)			
Yes	7 (.92)	22 (8.1)	29 (2.8)
No	36 (4.7)	34 (12.5)	70 (6.8)
Clinically diagnosed for depression (n = 99)	43 (5.7)	56 (20.6)	99 (9.6)
Currently taking depression medications (n = 30)	14 (1.8)	16 (5.9)	30 (2.9)

Abbreviations: M, mean; SD, standard deviation; BMI, body mass index.

(61%) reported not using because they did not know much about it.

Twenty-six percent (n = 69) of depressed pregnant women reported use of a complementary health care approach. About 71% of depressed pregnant women had thought of using complementary health care approaches to manage their weight or stress, 29% had never thought of using complementary health care approaches to manage weight or stress, and 84% would consider using complementary health care approaches to manage their weight or stress during pregnancy. A majority of depressed pregnant women (53%) were interested in using yoga to manage their stress during pregnancy. Of the depressed pregnant women who had used a complementary health care health care approach (n = 69), the top 5 most popular types were prayer (44%), yoga (33%), meditation (29%), massage (26%), and mindfulness (22%). Most depressed pregnant

Table 2. Mean Differences in Lifestyle Factors Between Nondepressed and Depressed Pregnant Women.

Lifestyle Factor	Nondepressed, M ± SD	Depressed, M ± SD	*t*	*P*	*d*[a]
Anxiety (STAI)	33.11 ± 10.61	48.6 ± 10.65	−20.57	<.001	1.46
Stress (PSS)	12.23 ± 6.12	21.47 ± 5.34	−23.3	<.001	1.61
Social Support (MOS-SS)	79.15 ± 20.75	59.18 ± 23.06	12.39	<.001	0.91
Mindfulness (MAAS)	4.43 ± 0.91	3.43 ± 0.83	16.06	<.001	1.15
Sleep	7.1 ± 3.26	9.01 ± 3.21	−8.33	<.001	0.59

Abbreviations: M, mean; SD, standard deviation; STAI, State Trait Anxiety Inventory; PSS, Perceived Stress Scale; MOS-SS, Medical Outcome Study–Social Support Survey; MAAS, Mindful Attention Awareness Scale.
[a]Cohen's *d*.

women who engaged in some sort of mind-body practice (ie, yoga, meditation, Tai Chi, Qigong; 71%) reported using a meditative state. Stress reduction (77%) was the top reason for using complementary health care approaches, and the top benefit for use was both improved mental health (67%) and stress reduction (67%). Most depressed pregnant women (84%) felt that complementary health care approaches somewhat or very much helped improve their condition. Approximately 21% of depressed pregnant women were using complementary health care approaches as an alternative to conventional health care. Of the depressed pregnant women who reported never using a complementary health care approach (n = 192), 47% reported not using because they did not know much about it. See Table 3 for the complementary health care approaches used in nondepressed pregnant women.

Discussion

The purpose of this study was to (1) describe the differences in mental health (ie, stress, anxiety) and lifestyle factors (ie, physical activity, diet, sleep, social support, mindfulness) of depressed pregnant women as compared to nondepressed pregnant women and (2) describe the perceptions, uses of, and interests in complementary health care approaches in depressed and nondepressed pregnant women. Just over 26% of pregnant women in our sample had clinically relevant symptoms of depression (≥12 on the EPDS), consistent with previous studies reporting depression rates during pregnancy between 9.8% and 28.3% (depending on study cohort and depression scale used).[45,64,65] Though a considerable proportion of pregnant women in our study screened positive on the EPDS for depression (≥12), when depressed pregnant women (n = 272) were asked if they had been clinically diagnosed with and currently suffering from depression only 21% said yes. Additionally, only a small amount (8.1%) of depressed pregnant women asked for help for depression from a doctor, nurse, or other health care professional. Just over 23% of depressed pregnant women were currently receiving counseling or therapy for depression and 5.9% were currently taking medication for depression. These data are consistent with the literature[3,24,27,66,67] and highlight the significant amount of women with clinically relevant levels of depression that may not be receiving treatment. Pregnant women may have difficulty recognizing symptoms of depression during pregnancy,[3,8,27,68] which may play a role in their decision to seek treatment. Encouraging HCPs to assess and treat/refer for depression during pregnancy is warranted as well as exploring strategies to encourage pregnant women to seek help for depression.

Lifestyle Factors

Depressed pregnant women in our sample had significantly higher levels of anxiety and stress, as well as worse sleep quality, levels of mindfulness, and social support as compared to nondepressed pregnant women. These modifiable lifestyle factors may play a role in depression during pregnancy. Research suggests that pregnant women with high depression scores (≥12 on the EPDS) typically experience comorbid conditions such as anxiety disorders[69] and stress,[70] which complicate pregnancy outcomes and are strong risk factors for postpartum depression.[8] In nonpregnant populations, depression and sleep have a strong association,[71] but their relationship during pregnancy is complex. Findings in a study by Okun and colleagues suggest that depression and disturbed sleep during pregnancy interact to increase risk for adverse pregnancy outcomes and chronic disease (eg, cardiovascular disease, obesity) by increasing an exaggerated inflammatory profile.[72] Our findings highlight that depressed pregnant women may be experiencing worse sleep quality compared to nondepressed pregnant women. HCPs may need to specifically address sleep disturbance in depressed pregnant women. The relationship between sleep and depression during pregnancy warrants further investigation.

High levels of mindfulness and social support have been shown in the literature to improve depressive symptoms and may be protective factors for depression during pregnancy.[73,74] The literature suggests that social support protects the emotional well-being of the mother by buffering the impact of life stress.[75] In our sample, depressed pregnant women had significantly lower social support scores. Though our study did not report on differences between low or high socioeconomic status, depressed pregnant women of low socioeconomic status have been reported to experience higher levels of depression and lower levels of social support.[76,77] Recently, social support has been the target of psychosocial interventions because of its emerging importance in depressed pregnant women and is a predictor of depression during pregnancy and postpartum. Hahn-Holbrook and colleagues found that social support

Table 3. Questions Pertaining to the Perceptions, Uses of, and Interests in Complementary Health Care Approaches.

	Question and Frequency		
	Q1. Have you ever used a complementary health care health care approach (N = 984)?		
Response	Nondepressed, n (%)	Depressed, n (%)	Overall, n (%)
Yes	260 (36.0)	69 (26.4)	329 (33.4)
No	463 (64.0)	192 (73.6)	655 (66.6)

	Q2. Type and time of complementary health care approach used:					
	Previous pregnancy		Prepregnancy		Currently	
	Nondepressed, n (%) N = 260	Depressed, n (%) N = 69	Nondepressed, n (%) N = 260	Depressed, n (%) N = 69	Nondepressed, n (%) N = 260	Depressed, n (%) N = 69
Yoga	68 (26.2)	20 (29.0)	165 (63.5)	39 (56.5)	95 (36.5)	23 (33.3)
Meditation	29 (11.2)	11 (15.9)	85 (32.7)	27 (39.1)	67 (25.8)	20 (29.0)
Mindfulness	24 (9.2)	6 (8.7)	65 (25.0)	18 (26.1)	59 (22.7)	15 (21.7)
Qigong	0 (0.0)	1 (1.4)	6 (2.3)	2 (2.9)	0 (0.0)	1 (1.4)
Acupuncture	9 (3.5)	1 (1.4)	44 (16.9)	8 (11.6)	6 (2.3)	3 (4.3)
Chiropractic	51 (19.6)	9 (13.0)	101 (38.8)	28 (40.6)	67 (25.8)	12 (17.4)
Naturopathy	11 (4.2)	5 (7.2)	32 (12.3)	6 (8.7)	13 (5.0)	1 (1.4)
Massage	55 (21.2)	14 (20.3)	142 (54.6)	35 (50.7)	88 (33.8)	18 (26.1)
Aruveyda	0 (0.0)	0 (0.0)	12 (4.6)	5 (7.2)	1 (0.4)	0 (0.0)
Tai Chi	2 (0.8)	3 (4.3)	5 (1.9)	2 (2.9)	5 (1.9)	0 (0.0)
Chinese medicine	2 (0.8)	0 (0.0)	19 (7.3)	2 (2.9)	2 (0.8)	2 (2.9)
Homeopathy	24 (9.2)	3 (4.3)	58 (22.3)	8 (11.6)	35 (13.5)	6 (8.7)
Biofeedback	1 (0.4)	2 (2.9)	7 (2.7)	2 (2.9)	2 (0.8)	0 (0.0)
Prayer	81 (31.2)	18 (26.1)	113 (43.5)	28 (40.6)	117 (45.0)	30 (43.5)
Shamanism	2 (0.8)	1 (1.4)	4 (1.5)	3 (4.3)	2 (0.8)	0 (0.0)
Energy healing (eg, Reiki)	7 (2.7)	1 (1.4)	21 (8.1)	4 (5.8)	11 (4.2)	3 (4.3)

	Q2a. When using yoga, meditation, mindfulness, Tai Chi, or Qigong, was a meditative state encouraged and/or did you strive to achieve a meditative state (ie, focusing on breath, acknowledging the present moment)?		
	Nondepressed, n (%) N = 213	Depressed, n (%) N = 59	Overall, n (%) N = 272
Yes	164 (77.0)	42 (71.2)	206 (75.74)
No	49 (23.0)	17 (28.8)	66 (24.26)

	Q2b. Reasons for using complementary health care approaches:		
	N = 260	N = 69	N = 329
Relaxation	208 (80.0)	52 (75.4)	260 (79.0)
Stress reduction	182 (70.0)	53 (76.8)	235 (71.4)
Weight loss/ management	36 (13.8)	16 (23.2)	52 (15.8)
Illness	21 (8.1)	5 (7.2)	26 (7.9)
Pain management	119 (45.8)	31 (44.9)	150 (45.6)
Allergies	12 (4.6)	1 (1.4)	13 (4.0)
Restore energy imbalances	37 (14.2)	6 (8.7)	43 (13.1)
Other	14 (05.4)	4 (5.8)	18 (5.5)

(continued)

Table 3. (continued)

	Q2c. What benefits do you like about using complementary health care approaches?		
	N = 260	N = 69	N = 329
Improved emotional health	160 (61.5)	43 (62.3)	203 (61.7)
Improved spiritual health	110 (42.3)	27 (39.1)	137 (41.6)
Improved mental health	150 (57.7)	46 (66.7)	196 (59.6)
Treating the whole person	99 (38.1)	27 (39.1)	126 (38.3)
Focus on prevention	77 (29.6)	14 (20.3)	91 (27.7)
Limited side effects	106 (40.8)	20 (29.0)	136 (41.3)
Stress reduction	178 (68.5)	46 (66.7)	224 (68.1)
Relaxation	203 (78.1)	45 (65.2)	248 (75.4)
Enjoyable	146 (56.2)	35 (50.7)	181 (55.0)
Weight loss/ management	30 (11.5)	9 (13.0)	39 (11.9)
Physical strengthening	67 (25.8)	22 (31.9)	89 (27.1)
Other	8 (3.1)	3 (4.3)	11 (3.3)
	Q2d. What extent do you feel that complementary health care approaches help improve your condition(s)?		
	N = 258	N = 68	N = 326
Very much	129 (50.0)	26 (38.2)	155 (47.5)
Somewhat	105 (40.7)	31 (45.6)	136 (41.7)
Undecided	17 (6.6)	8 (11.8)	25 (7.7)
Not really	4 (1.6)	2 (02.9)	6 (1.8)
Not at all	3 (1.2)	1 (1.5)	4 (1.2)
	Q2e. Do you use complementary health care approaches as an alternative (ie, instead of) to conventional health care?		
	N = 255	N = 67	N = 322
Yes	23 (9.0)	14 (20.9)	37 (11.5)
No	232 (91.0)	53 (79.1)	285 (88.5)
	Q3. What are your reasons for not trying a complementary health care approach?		
	N = 463	N = 192	N = 655
Nowhere to try it out	79 (17.1)	34 (17.7)	113 (17.3)
Injury	4 (0.9)	6 (3.1)	110 (16.8)
Soreness	9 (1.9)	15 (7.8)	24 (3.7)
Emotional trigger	4 (0.9)	27 (14.1)	31 (4.7)
Irritability	5 (1.1)	15 (7.8)	20 (3.1)
Cost	104 (22.5)	25 (13.0)	129 (19.7)
Boring	24 (5.2)	9 (4.7)	33 (5.0)
Don't know much about it	308 (66.5)	90 (46.9)	398 (60.8)
Clashes with religious beliefs	8 (1.7)	1 (0.5)	9 (1.4)
Safety concerns	44 (9.5)	14 (7.3)	58 (8.9)
Other	22 (4.8)	4 (2.1)	26 (4.0)

(continued)

Table 3. (continued)

	Q4. During pregnancy, have you ever thought of using complementary health care approaches to:		
	N = 702	N = 256	N = 960
Manage weight only	37 (5.3)	22 (8.6)	59 (6.1)
Manage weight and stress	202 (28.8)	71 (27.7)	273 (28.4)
Manage stress only	149 (19.6)	88 (34.4)	237 (24.7)
Neither	314 (44.7)	75 (29.3)	389 (40.5)
	Q5. During pregnancy, would you ever consider using complementary health care approaches to:		
	N = 704	N = 256	N = 960
Manage weight only	34 (4.8)	25 (9.8)	59 (6.1)
Manage weight and stress	362 (51.4)	118 (46.1)	480 (50.0)
Manage stress only	122 (17.3)	71 (27.7)	193 (20.1)
Neither	186 (26.4)	42 (16.4)	228 (23.8)
	Q6. What types of complementary health care approaches would you be interested in using to manage your weight during pregnancy? (n = those who selected manage weight only or manage weight and stress in Question 5)		
	N = 396	N = 143	N = 539
Yoga	338 (85.4)	101 (70.6)	439 (81.4)
Meditation	137 (34.6)	53 (37.1)	190 (35.3)
Mindfulness	79 (19.9)	28 (19.6)	107 (19.9)
Acupuncture	71 (17.9)	22 (15.4)	93 (17.3)
Chiropractic	145 (36.6)	51 (35.7)	196 (36.4)
Naturopathy	30 (7.6)	14 (9.8)	44 (8.2)
Massage	255 (64.4)	72 (50.3)	327 (60.7)
Aruveyda	14 (3.5)	6 (4.2)	20 (3.7)
Qigong	9 (2.3)	1 (0.7)	10 (1.9)
Tai Chi	26 (6.6)	4 (2.8)	30 (5.6)
Any	63 (15.9)	35 (24.5)	98 (18.2)
Other	3 (0.8)	0 (0.0)	3 (0.6)
	Q7. What types of complementary health care approaches would you be interested in using to manage your stress during pregnancy? (n = those who selected manage stress only or manage weight and stress in Question 5)		
	N = 484	N = 189	N = 673
Yoga	361 (74.6)	101 (53.4)	462 (68.6)
Meditation	235 (48.6)	70 (37.0)	305 (45.3)
Mindfulness	123 (25.4)	45 (23.8)	168 (25.0)
Acupuncture	88 (18.2)	36 (19.0)	124 (18.4)
Chiropractic	165 (34.1)	55 (29.1)	220 (32.7)
Naturopathy	27 (5.6)	13 (6.9)	40 (5.9)
Massage	335 (69.2)	78 (41.3)	413 (61.4)
Aruveyda	10 (2.1)	3 (1.6)	13 (1.9)
Qigong	6 (1.2)	1 (0.5)	7 (1.0)
Any	80 (16.5)	36 (19.0)	116 (17.2)
Other	3 (0.6)	3 (1.6)	6 (0.9)

biologically mitigates depression by reducing stress-releasing hormones, and researchers suggest that the timing of social support interventions is extremely important. Early social support interventions that target depressed pregnant women with low socioeconomic status are warranted.[78] Research on strategies to provide early social support is recommended.

Similarly, mindfulness may also be protective against depression in pregnancy. Depressed pregnant women in our sample had lower levels of mindfulness when compared to nondepressed pregnant women. Previous mindfulness interventions have shown that higher mindfulness levels are associated with lower depressive symptomology in pregnant women.[79] However, a limited number of mindfulness studies have been conducted in pregnant women with depression and have had small sample sizes with poor study designs. A review by Hall and colleagues found only 6 mindfulness interventions with depression outcomes in pregnant women and none of the studies were randomized controlled trials.[79] Of late, the mechanisms by which mindfulness reduces depressive symptomology has become of interest. Paul and colleagues suggest that mindfulness protects against depression by limiting rumination and negative bias (key risk factors for depression) and reducing automatic emotional responding to negative stimuli.[80] Mindfulness also cultivates self-compassion, which has been reported to be a beneficial factor that is protective against depression and relapse/recurrence.[81] More research is needed, especially randomized controlled trials, to determine the efficacy of mindfulness interventions for depression and the pathways by which mindfulness protects against depression in pregnant women.

Depressed pregnant women often have unhealthy lifestyle behaviors (eg, poor sleep, low social support), which may spiral into even worse depression, may lead to subsequent postpartum weight gain and/or retention, and may contribute to the development of obesity in the postpartum period.[82,83] Not only is it important for HCPs to screen for depression during pregnancy, but screening and managing (ie, treating and/or referring to care) these modifiable lifestyle factors (eg, mental health, sleep, social support, mindfulness) may help inadvertently improve depression in pregnant women and enhance health in the postpartum period. Furthermore, identifying nonpharmacological strategies such as complementary health care approaches to help depressed pregnant women improve lifestyle behaviors should be explored further.

Perceptions, Uses of, and Interests in Complementary Health Care Approaches

In our study, depressed pregnant women felt the most benefit for use of complementary health care approaches was improved mental health and stress reduction. Similar to our study, in a recent nationally representative survey 86.1% of 34 525 adults aged 18 and older reported reduction of stress as the major reason for using yoga specifically.[84,85] Our data suggest that depressed pregnant women may experience symptoms of stress and anxiety simultaneously with depressive symptoms when compared with nondepressed pregnant women and use complementary health care approaches to relieve their stress for improved mental health many complementary health care approaches incorporate mindfulness,[86] which can help regulate emotions, a pathway by which mindfulness also promotes mental health.[51] Emotion regulation is a process by which individuals control their emotions in response to external stimuli (eg, environmental demands),[51] in turn decreasing circulating cortisol levels and providing behavioral therapy (eg, increasing motivation).[87] Complementary health care approaches may be a more acceptable intervention for the treatment of depression during pregnancy due to their nonpharmacologic nature and may help pregnant women recognize feelings and emotions of depression as well as alleviate symptoms through the application of mindfulness. Utilizing nonpharmacological strategies such as complementary health care approaches to help pregnant women manage and treat depression and its related mental health distress needs to be explored in future trials.

Despite 71% of depressed pregnant women who had thought of using complementary health care approaches to manage their weight and/or stress during pregnancy, only 26% had used or were currently using them.[3] However, 84% of depressed pregnant women would consider using a complementary health care approach to manage their weight and/or stress during pregnancy and more than half were interested in using yoga. Our data suggest that depressed pregnant women are interested in using complementary health care approaches for weight and/or stress management during pregnancy, particularly yoga, yet many do not use them. Forty-seven percent of depressed pregnant women reported not using them because they did not know much about them. Complementary health care approaches that apply a movement component (eg, yoga, Tai Chi, Qigong) especially may encourage GWG management due to the combination of both physical activity and application of mindfulness and relaxation techniques.[44] Movement-based complementary health care approaches may increase energy expenditure during practice, facilitate exercise outside of practice (due to reducing back and joint pain), heighten mindfulness, improve mood, reduce stress, reduce food intake, increase connection to body, and enhance awareness of feelings of fullness.[87] In a recent review by Gong and colleagues, researchers concluded that depressed pregnant women who participated in integrated yoga (physical postures, breathing exercises, meditation, mindfulness) had better mental health outcomes as compared to depressed pregnant women who participated in exercise-based yoga (ie, physical postures only) and may be a better choice for pregnant women.[88] Findings in a study by Larkey and colleagues suggest that meditative movement exercises (eg, yoga, Tai Chi, Qigong) may achieve weight loss without perceived hard work of vigorous physical activity and dietary restrictions. Additionally, mindfulness-based interventions may reduce stress-related emotions (eg, anxiety, depression), body mass index, metabolic imbalance, and disordered eating by focus on body awareness, emotional self-regulation, and attention to inner ''wisdom'' cues.[89] Because depressed pregnant women in our sample exhibited unhealthier lifestyle behaviors compared with nondepressed pregnant women, complementary health care approaches utilizing a movement component (eg, yoga, Tai Chi, Qigong) may be an effective approach to simultaneously manage GWG, depression, and

related mental health distress (eg, stress, anxiety). Future research is necessary to test the effectiveness of complementary health care approaches in the simultaneous management of GWG and depression and determine which types are most beneficial in pregnant women. To our knowledge, no such intervention exists.

Interestingly, only 54% of nondepressed pregnant women (as compared to 71% of depressed pregnant women) had thought about using complementary health care approaches to manage their weight and/or stress during pregnancy. As reported above, nondepressed pregnant women have lower stress and anxiety levels when compared to depressed pregnant women. As a result, many nondepressed pregnant women may not consider looking for stress management techniques because they simply do not feel stressed. On the other hand, depressed pregnant women experience heightened mental health distress and may look for resources to help manage their mental health distress, thereby increasing their interest for using complementary health care approaches. Future research utilizing yoga as a modality to manage weight and improve mental health in depressed pregnant women may be an acceptable and preferred method and should be tested to determine its acceptability and efficacy.

Limitations

Despite this study being one of the first to explore the perceptions, uses of, and interests in complementary health care approaches in women with depressive symptoms, there were a few limitations to note. First, because the majority of participants in this study were pregnant, Caucasian, and middle class, the generalizability of the findings are limited to these populations. Second, administering a survey presents inherent self-report limitations[90] including biased results, participant burden resulting from length of survey, potential data errors, and incorrect interpretation of survey questions. Third, the design of this study was cross-sectional; therefore, no causal relationships can be determined from analyses. For the differences found between depressed and nondepressed pregnant women regarding lifestyle behaviors, use of complementary health care approaches could be explained as behavioral choices affecting mental health; conversely, it could be that preexisting depression influences these behavioral choices. It would be important to explore these relationships temporally and learn how to mitigate this challenging cluster of behaviors and mental health.

Conclusion

Few interventions have used complementary health care approaches to reduce mental health distress (eg, stress, anxiety, depression) in depressed pregnant women and many are limited in sample size and study design.[91-94] Research in this area during pregnancy is lacking. Sixty-one percent of pregnant women (independent of depression status) in our sample report not using complementary health care approaches because they do not know much about them. Sadly, there is literature to suggest that HCPs do not provide physical activity and/or stress management resources to patients.[26] This provides a unique opportunity to educate pregnant women and their HCPs about the benefits of using complementary health care approaches to treat and prevent excessive GWG and maternal mental health during pregnancy. Perhaps education about what complementary health care approaches are, types to consider trying, and the benefits of using them may help encourage the use of complementary health care approaches and thus manage GWG and symptoms of mental health distress. HCPs could provide recommendations and/or information to pregnant women regarding GWG, stress, and how to manage both using complementary health care approaches. Since pregnant women have frequent interactions with their HCPs, this may be an opportune time to disseminate information about the use of complementary health care approaches for managing GWG and mental health during pregnancy. Pregnant women may be more receptive to recommendations from their HCPs and may be more willing to try complementary health care approaches.[95,96] Furthermore, rigorous screening for depression and assessment of lifestyle factors is recommended in early pregnancy. Additionally, data related to complementary health care approaches to simultaneously reduce mental health distress and GWG in pregnancy is nonexistent. The known benefits of complementary health care approaches on mental health are well established,[97,98] as well as their potential for weight management in nonpregnant populations.[87,89] Because of the safety and low cost[99] of complementary health care approaches and preference for nonpharmacological interventions in pregnant women,[35,37,38] there is a need to explore the efficacy of complementary health care approaches as a strategy for maternal mental health and GWG management in depressed pregnant women to improve pregnancy and birth outcomes. More research is needed to inform future interventions targeted to improve physical and mental health outcomes for the mother and fetus. Future interventions should design trials to test the effectiveness of complementary health care approaches to simultaneously manage maternal mental health (ie, depression) and GWG in depressed pregnant women.

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Author Contributions

JM developed the idea for the study, acted as project coordinator on the study, drafted the initial manuscript, and prepared the manuscript for publication. JLH contributed to conceptualization of the study, provided feedback on revisions of the manuscript, and served as a mentor on this study. JAL contributed to the conceptualization of the study design and provided feedback and revisions to the manuscript. DM provided feedback and revisions to the manuscript and assisted with data analyses. LKL provided feedback and revisions to the manuscript.

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