Published in final edited form as:
Child Youth Care Forum. 2012 June ; 41(3): 229–245. doi:10.1007/s10566-011-9161-7.

Postpartum Depression Prevention for Reservation-Based American Indians: Results from a Pilot Randomized Controlled Trial

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Abstract

Background—Postpartum depression is a devastating condition that affects a significant number of women and their offspring. Few preventive interventions have targeted high risk youth, such as American Indians (AIs).

Objective—To evaluate the feasibility of a depression prevention program for AI adolescents and young adults.

Methods—Expectant AI women (*mean age* = 18.15; *N* = 47) were randomized (1:1) to either the *Living in Harmony program* (LIH, an 8 lesson cognitive-behaviorally based program) or an Educational–Support program (ES, an 8 lesson education program). Both interventions were

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delivered by AI paraprofessionals. Adolescents were evaluated during their pregnancy at baseline, at post-intervention, and at 4, 12, and 24 weeks postpartum. The primary outcome measure was the Center for Epidemiological Studies–Depression scale (CES-D). Additional measures of depression included the onset of major depressive disorder (MDD; assessed via computerized diagnostic interview) and the Edinburgh Postpartum Depression Scale (EPDS). Secondary outcomes included changes in mothers' global functioning and social support.

Results—At all post intervention assessments, mothers in both groups showed similar reductions in depressive symptoms and similar rates of MDD (0 and 6% in LIH and ES respectively). Both groups of participants also showed similar improvements in global functioning. No changes in either group were found on the measure of social support.

Conclusions—Findings suggest that both paraprofessional-delivered interventions may reduce symptoms of depression among AIs. Replication with a larger sample, a usual care control condition, blinded evaluators, and a longer follow-up is needed.

Keywords

American Indian; Postpartum depression; Paraprofessional

Introduction

Mood disorders during pregnancy and the postpartum period are potentially devastating conditions that affect a significant number of women and their offspring. Research suggests that 80–85% of expectant mothers will develop a mild mood disturbance (blues) during or after their gestational period and 8–15% will experience a major depressive disorder (MDD; Gotlib et al. 1989; Kumar et al. 1984; O'Hara and Swain 1996; O'Hara et al. 1990; Reck et al. 2008). Hallmark symptoms of these disorders include loss of interest in previously pleasurable activities, feelings of guilt, worthlessness, helplessness and hopelessness that are severe and impairing and last for at least 2 weeks. Among adolescents, this rate is even higher, with estimates of antenatal depression ranging between 16 and 44%, almost twice as high as among adult pregnant women and non-pregnant adolescents (Gross et al. 2002; Figueiredo et al. 2007; Miller 1998). Moreover, prospective studies indicate that elevated levels of postnatal depression are preceded by high levels of prenatal depressive symptoms (Heron et al. 2004). This research suggests an advantage of intervening during pregnancy to reduce morbidity associated with depression.

Elevated depressive symptoms and depressive disorders during pregnancy and postpartum not only affect women but are associated with a host of negative outcomes for their offspring including low birth weight, premature delivery, delivery complications, low fetal growth, and poor performance on neonatal behavioral assessments (Chung et al. 2001; Hedegaard et al. 1996; Lundy et al. 1999; Orr and Miller 1995; Steer et al. 2002). The negative impact of depressive symptoms and disorders extends beyond birth outcomes to mother–child bonding and attachment, parenting, and later child functioning (Field 1995; Martins and Gaffan 2000; Orr and Miller 1995).

In light of the prevalence and consequences of prenatal and postpartum depression, there is a critical need for both treatment and preventive interventions. Preventive interventions in particular hold the promise of decreasing the likelihood that expectant mothers will experience MDD during pregnancy and postpartum, minimize the need for costly treatment, and ultimately decrease the long-term impact of depression on both the mother and child. Unfortunately, there are few published studies examining the efficacy of preventive interventions during pregnancy using randomized controlled designs; even fewer have been conducted with adolescents, and none have focused on American Indian (AI) populations.

Although findings have not been uniformly positive (e.g., Logsdon and Gennaro 2005; Crockett et al. 2008; Reid et al. 2002), results from several studies suggest that psychosocial interventions, namely interpersonal psychotherapy (IPT) and cognitive behavioral therapy (CBT) may reduce depressive symptoms during pregnancy as well as postpartum. For instance, in a pilot study, Zlotnick et al. (2001) evaluated the effectiveness of a four session IPT-oriented intervention with pregnant women ($N = 37$) receiving public assistance. The authors found that at three months postpartum none of the women in the intervention group, compared to 33% in the control group (treatment as usual; TAU), met criteria for MDD. Similar findings were reported in a larger study (Zlotnick et al. 2006). Elliott et al. (2000) randomly assigned "vulnerable" pregnant adults ($N = 99$) to an 11-session group intervention (based on a combination of strategies such as psychoeducation, changing negative attributions, and increasing social support) or TAU. Among first time mothers, depression scores on the Edinburgh Postpartum Depression Scale (EPDS) and rates of depressive disorders were significantly lower in the intervention (19%) compared to TAU (39%) group at a 3 month follow up. While these findings are encouraging, more data are needed to determine the usefulness of preventive interventions for postpartum depression, particularly among vulnerable populations.

The current study was designed to extend this literature and to address the needs of one of the most vulnerable populations in the United States, reservation-based expectant AI adolescents and young adults. Reservation-based pregnant White Mountain Apaches were targeted for this study because they are at high risk for the development of depressive symptoms and disorders (Ginsburg et al. 2008). AI adolescents in general have the poorest health status among adolescents in the US, as measured by rates of premature mortality and morbidity and high rates of mental illness (e.g., Whitbeck et al. 2006). AI adolescents also have significant demographic risk factors for depression such as poverty, high substance use and school drop-out rates, and residential instability, that compound normal stressors for pregnant teenagers (Blum et al. 1992; US DHHS 2004). These health and demographic disparities are related to both historical and contemporary factors that impact the lives of AI youth and their families. First, a long history of federal policies relating to land subjugation and tribal community relocation has resulted in the loss of tribal territories, degradation of Indian political and economic systems, languages, traditions and cultures; in essence, the destruction of the social fabric of Indian communities, which are now being rebuilt. Second, but not unrelated, day-to-day life for AI families is difficult. AI youth grow up in communities with serious problems of unemployment, poverty, challenged educational systems, and stressful home lives plagued by broken nuclear and extended family networks. Consequently, the needs of this population are significant.

The goal of the intervention, entitled *Living in Harmony* (LIH), was to reduce depressive symptoms during pregnancy and prevent the onset of MDD postpartum. The intervention was theoretically-derived, based on a cognitive behavioral therapeutic (CBT) approach, culturally adapted, and delivered by AI paraprofessionals. The preliminary effectiveness of LIH was evaluated using a randomized controlled trial comparing LIH to an eight lesson education-support comparison condition (ES). Both interventions were comprised of 8 lessons and were delivered during pregnancy (initiated prior to 29 weeks gestation). Assessments were conducted at pre and post-intervention and at 4, 12, and 24 weeks postpartum. Our primary hypothesis was that LIH would result in greater reductions in depressive symptoms and fewer women diagnosed with MDD. In addition, because social support has been linked to lower levels of depressive symptoms (e.g., Margolin 2006) enhancing social support was targeted in the LIH intervention. Thus, we hypothesized that women in LIH, relative to ES, would report greater improvement in social support. Finally, consistent with previous research examining the impact of treatments for depression (e.g.,

TADS 2004), we hypothesized that women in LIH, relative to ES, would report superior functioning as a result of the CBT skills they learned.

Method

Participants

Participants were pregnant adolescent and young adult Apache American Indian women. For inclusion in the study, participants needed to be age 15–19 years old, at a gestational age of 28 weeks or less (in order to complete intervention prior to delivery) and have a Center for Epidemiological Studies-Depression scale (CES-D) score of 16 or higher, indicating symptoms of depression at baseline. Participants were excluded if they met criteria for current MDD (as established by the *Diagnostic Interview Schedule for Children-Computer Version* (DISC; Shaffer et al. 2000), met criteria for another psychiatric disorder (e.g., substance abuse) or condition (i.e., suicidality) requiring immediate intervention, and/or were receiving psychiatric care for depression or any other mental or behavioral health problem.

Sixty-one participants completed an initial assessment. Among them, 14 were not randomized due to either (1) having a CES-D score below 16, (2) needing immediate treatment, or (3) they were unable to be located, leaving 47 randomized participants, of whom 22 were assigned to LIH and 25 to ES.

Measures

Center for Epidemiological Studies-Depression scale—(CES-D; Weissman et al. 1997). The CES-D is a widely used self-report 20-item depression-screening instrument assessing symptom frequency on a 4-point Likert scale (range 0–60). This measure has been well validated, and was chosen due to widespread use with adult and adolescent samples. Higher scores represented more depressive symptoms. Cronbach's coefficient alphas were 0.76, 0.78, 0.79, 0.70, 0.72 at pre and post-intervention and at 4, 12, and 24 weeks post-partum, respectively. The alphas were stable overtime. That is, they were not significantly different from each other based on the procedure outlined by Feldt et al. (1987).

Edinburgh Postnatal Depression Scale—(EPDS; Cox et al. 1987) is among the most widely used self-report screens for adult postpartum depression. It is a self-report instrument and was included in the current battery to evaluate its utility and acceptability for the study population. In addition, the use of this measure will facilitate comparisons between the current study and other studies on postpartum depression. Cronbach's coefficient alphas were 0.80, 0.79, 0.81, 0.80, 0.86 at pre and post-intervention and at 4, 12, and 24 weeks postpartum, respectively. These alphas were stable overtime.

The Diagnostic Interview Schedule for Children-Computer Version—(DISC; Shaffer et al. 2000) was used to assess for the presence of MDD and is a highly structured diagnostic interview designed for use by lay interviewers in epidemiological studies of children and adolescents. For the present study, only the MDD module was used as an outcome. The presence of a diagnosis was determined via a computer algorithm based on the presence, severity, and duration of symptoms. Studies indicate that this instrument has acceptable psychometric properties (Fisher et al. 1993; Shaffer et al. 1993, 2000). This instrument was specifically selected because it had been used with AI youth on other reservations and can be administered by paraprofessionals.

The Social Support Index—(Moore et al. 1995; SSI). The SSI assessed the degree to which participants felt supported by other people in their life. This self-report measure

contains 20 items (e.g. “When I have trouble or need help, I have someone I can really talk to”) which were rated on a 5-point Likert scale ranging from 1 (not at all true) to 5 (very true) yielding a range of 20–100. Cronbach's coefficient alphas for this measure were 0.92, 0.94, 0.95, 0.97, 0.97 at pre and post-intervention and at 4, 12, and 24 weeks postpartum, respectively. These alphas were stable overtime.

Global Assessment Scale for Children—(CGAS; Shaffer et al. 1983). The CGAS, completed by an AI interviewer, is a modification of the adult Global Assessment Scale and provided a measure of current global impairment and functioning. The scale ranges from 1 (lowest) to 100 (highest) functioning. The CGAS has been widely used in clinical trials.

Intervention Descriptions

Living in Harmony (LIH) Overview—LIH adapted CBT curricula from the *Coping with Depression* (Clarke et al. 1990) and *The Treatment for Adolescent Depression Study* manuals (Curry and Wells 2000). Modifications were made based on feedback from study staff, participants, and a local Apache Advisory Board.

LIH Format—LIH included eight weekly, 30–60-minute in-home (or in office) sessions initiated prior to 29 weeks of gestation and included three monthly booster sessions. The focus of each session was on teaching new skills and providing the opportunity to practice these skills both within sessions and at home (i.e., during daily life activities). To help reinforce and generalize the skills, specific homework tasks were assigned at each lesson and a workbook was given to all participants.

LIH Content—The main cognitive and behavioral skills taught included:

1. *Psychoeducation*: Participants were taught to recognize signs and symptoms of depression (e.g., behavior, negative cognitions, affect). They were also provided with important information about how such symptoms could be alleviated via the cognitive behavioral model.
2. *Identifying and modifying depressive cognitions and behaviors*: Participants learned to identify maladaptive cognitions and were taught strategies for adopting realistic, coping-focused thinking. Behavioral skills included increasing engagement in pleasurable and positive activities to improve mood.
3. *Problem-solving skills*: Problem-solving skills were taught to participants to help them plan effective resolutions to conflicts and other interpersonal/emotional difficulties. A six step model (using the acronym SPIRIT) involved brainstorming solutions, generating alternative solutions, and examining outcomes of solutions.
4. *Enhancing social supports*: Participants were taught how to increase social support in order to reduce isolation and provide needed assistance. Participants also explored the role changes associated with becoming a parent and ways to access social support including community services.
5. *Planning for the future*: Modeled from relapse prevention strategies, participants were taught how to anticipate future challenges and practiced how to manage difficult situations using acquired skills.

LIH Adaptations for AI Participants—Formative research with community stakeholders pertaining to the use of a CBT intervention with the study population supported the use of CBT as the method was consistent with values and practices that are regularly employed on the Reservation for the treatment of low mood and energy. For instance, the

Apache people generally understand the role of past experiences as a determinant of current feelings and behavior and focus on how persons in the “here and now” can overcome past difficulties and move positively into the future.

Within the Apache community, the term “depression” is not commonly used in the local vernacular. In fact, the constellation of physical symptoms, moods, thoughts and causes ascribed to “depression” in the western vernacular are not lumped under one word or related concept in the Apache language. Physical symptoms such as fatigue or changes in appetite would not be typically understood by Apaches as a function of mental illness. Emotions related to western definitions of depression, such as sadness or anger, are described somewhat differently in Apache, with more nuanced meaning; for example, there are two different words for “sad” or “really sad,” as well as for “mad” or “really mad.” However, there is an Apache word, “How'shi,” translated as “somehow,” which is popular in its English form among adolescents and young adults, that comes closest in its negative form to the western term for depression. If an Apache individual says he or she is “somehow,” it means the individual is feeling markedly different (i.e., better or worse) than usual—off “center” from his or her usual mental, emotional and physical state. When an Apache tells a peer or parent he or she feels “somehow,” it is expected to evoke probing to better understand how the individual is feeling. Cognitive distortions associated with western definitions of depression, and even common sarcastic or exaggerated statements that are accepted in the Western vernacular (e.g., “I am going to fail my test”), are traditionally taboo for Apaches. Apaches are trained by culture and traditions to refrain from negative thoughts about oneself in the present or future, because they put one at risk for realizing one's thoughts. Furthermore, in the Apache tradition, the cause of what might be labeled as “mental health problems” is generally ascribed to external factors, which is inconsistent with some Western thinking about the causes of depression (e.g., neurobiological). For example, a person could have been “hexed” by another or could have inadvertently and unintentionally violated a tradition, which would invite bad spirits and related problems to perturb the individual.

Some but not all of this understanding was present at the onset of the development of the LIH intervention. While a community-based participatory research (CBPR) process was followed to adapt and create the intervention, the evolving relationships and continuing communication among the JHU-Apache research team shed increasing light on the important differences in perspectives on depression and mental health across cultures. Fortunately, all LIH lessons were delivered by Apache paraprofessional Family Health Educators (FHEs), who naturally navigated preferred cultural styles, accepted taboos, and expected ways one would relate to participants.

Education-Support Condition (ES)—This condition is based on the *Family Spirit* curriculum used in our previous work, which focuses on pregnancy and parenting education (Barlow et al. 2006).

ES Format—ES included eight weekly, 30–60-min in-home or office sessions (initiated prior to 29 weeks gestation) and three booster sessions. Participants were given a workbook to reinforce learning.

ES Content—The specific content of ES included: Understanding the Reproductive System (Session 1); Stages of Pregnancy (Session 2); Nutrition and Weight Gain (Sessions 3); Understanding Gestational Diabetes (Session 4 and 5); Preparing for Delivery (Session 6); Immunization (Session 7 and 8); American Indian Priority Diseases (Booster Session 1); Sexually Transmitted Diseases (Booster Session 2); Review of Educational Sessions (Booster Session 3).

Study Interventionists and Adherence—The interventionists (FHEs) were AI paraprofessionals with an Associates or Bachelors Degree. FHEs completed extensive training and at least one pilot case prior to enrolling participants in the study. Each FHE delivered both ES and LIH in order to protect against the threat to internal validity (i.e., that improvements in one group would be due to interventionist characteristics). Because of the possibility that the FHEs may use CBT strategies in the ES condition, the use of highly structured manuals, audiotaping of sessions, random checking of intervention adherence, and weekly supervision were used.

Procedure

Participants were referred to the study via the local Indian Health Service prenatal clinic or by word of mouth. Once in contact with study staff, participants and their parents (for youth under 18) signed a written consent form which described all study procedures. All study procedures were approved by the institutional review board at Johns Hopkins University and tribal councils. Following consent, all women completed the CES-D either in the research office or in their homes. Women who scored lower than 16 on the CES-D were ineligible and offered alternative services. Women who scored 16 or higher on the CES-D completed a baseline assessment. The baseline assessment occurred in a private office in the research trailer. During this assessment participants completed the measures above and were then provided with a computer to complete the C-DISC. Eligible participants, based on the baseline assessment, were randomized 1:1 to either LIH or ES. Any participant who met eligibility criteria, but appeared to have elevated risks (e.g., history of suicidal ideation) was referred to the Apache Behavioral Health Services for an additional interview to confirm that immediate treatment was not necessary. At post-intervention and at 4, 12 and 24 weeks postpartum, participants completed identical evaluations (either in their homes or in a private research office) to assess the impact of the interventions. Participants received Walmart gift cards as compensation for each evaluation completed.

Data Analysis Plan

With the exception of presence of MDD, all outcome variables were treated as continuous measures (CESD, EPDS, social support, and CGAS). To examine the differences in program effects on continuous outcomes, two analytical approaches were used. First, differences between the ES and LIH groups at each time point after the intervention were compared using analysis of covariance (ANCOVA), adjusting for the baseline scores. We also included the baseline by group interaction in all of the ANCOVA models to test potential differential intervention effects by the baseline measure of the same variable. In the second approach, we examined the differences of the intervention effects over time utilizing all of the repeated measures of the outcomes at baseline, posttest, 4, 12, and 24-week follow-up together within a growth curve modeling (GCM) framework. All analyses used an intent-to-treat approach (Little and Rubin 1987). Multiple imputation (Rubin 1987) with 20 imputation datasets, using SAS MI Procedure, was performed for handling missing data for examining the intervention effect with ANCOVA and GCM. We also used SAS® software for the analyses for ANCOVA and GCM. Because of the small sample size for the study, the findings should be interpreted with caution. In general, with categorical outcomes, researchers can test the effects at each time point through logistic regression and examine the differences over time using mixed models. However, because no individual in the LIH group developed MDD (i.e., no variation of the outcome) and only two in the ES developed major depression, these analytical procedures were neither appropriate nor feasible. Therefore, no analyses were performed for the MDD outcome.

Results

Descriptive Statistics

Retention—The attrition rate for the entire randomized sample was 28% (15 participants); 32% (7 out of 22) in the LIH condition and 24% (6 out of 25) in the ES condition. Analyses (*t* tests and Chi squares) were conducted to examine differences on demographic and clinical variables between the participants who dropped out of the study and those who completed the study. Participants who dropped out of the study were older ($p = 0.008$) but no other significant differences were found. Additional demographics appear in Table 1.

Intervention Attendance—Among the LIH and ES participants, the average number of lessons completed was 6 and 7 respectively, with a range of 0–8 and 1–8 respectively.

Baseline Group Comparisons—*t* tests for continuous variables and Chi square analyses for categorical variables were used to examine differences on demographic and clinical variables between the two intervention groups at baseline (see Tables 1 and 2). No significant differences were found between the two groups on any baseline variable.

Outcomes Analyses—Means and standard deviations on the CES-D and EPDS, and the number and percentage of individuals who developed MDD are presented in Table 2. Means and standard deviations on the SSI and CGAS are presented in Table 3. No analysis was performed for MDD; only 2 individuals in the ES group developed MDD across all assessment points. All participants who met diagnostic criteria for a disorder were referred for treatment. Tables 2 and 3 show that there were significant improvements on the CES-D, EPDS, and CGAS from baseline to post-intervention and follow-ups for both LIH and ES participants. However, controlling for the baseline differences, the ANCOVAs showed no significant differences *between* LIH and ES on each outcome measure at each post intervention assessment point. No significant group by baseline interactions were found either.

Growth curve models of the outcomes were tested under a multilevel framework using SAS 9.1 PROC MIXED. Two levels of data were included in these models, with repeated measures (level-1) nested within individuals (level-2). The intervention condition was a level-2 predictor. As shown in Fig. 1, three different forms of the intervention effects were considered most plausible (see Singer and Willett 2003). One form of the intervention effect was a change in the growth rate linearly (Model 1). The time scaling of the linear growth trajectory was set at 0, 2, 3, 5, and 8 to reflect the real time assessment points at pretest, posttest (8 weeks from the pretest) and at 4, 12 and 24 weeks follow-ups after intervention (i.e., divided by a unit of 4). A second plausible form of the intervention effect was a downward shift (e.g., for CES-D and EPDS) or an upward shift (e.g., for SSI and CGAS) of the scores from pretest to posttest and the change of the score maintained over time (Model 2). The time scaling of the growth trajectory was set at 0, 2, 2, 2, and 2 to reflect the stability of change over the follow-up assessments after intervention. The third plausible form was to simultaneously include both these forms of intervention effects (Model 3). To show differences of the intervention effects, the rates of changes on slope, the magnitudes of shift, or both need to be significantly different across the two intervention conditions. For contrast, Fig. 1 also included Model 0 to show no change of scores (no intervention effects) over time for both LIH and ES conditions.

We tested the shift and linear growth functions simultaneously to examine their unique and combined effects. The multilevel model equations of the fixed and random effects and the corresponding mixed model equation for testing the intervention effects are shown below:

$$\text{Level} - 1: Y_{ti} = \pi_{0i}(int) + \pi_{1i}(Shift) + \pi_{2i}(Time) + e_{ti}$$
$$\text{or, } Y_{ti} = \pi_{0i} + \pi_{1i}(Shift) + \pi_{2i}(Time) + e_{ti}$$

$$\text{Level} - 2: \quad \pi_{0i} = \beta_{00} + r_0$$
$$\pi_{1i} = \beta_{10} + \beta_{11}(Gruop) + r_1$$
$$\pi_{2i} = \beta_{20} + \beta_{21}(Gruop) + r_2$$

$$\text{Mixed: } Y_{tij} = \beta_{00} + \beta_{10}(Shift) + \beta_{11}(Shift)(Gruop) + \beta_{20}(Time) + \beta_{21}(Time)(Gruop) + [e_{ti} + r_0 + r_1(Shift) + r_2(Time)]$$

In these model equations, Y_{ti} is the observed outcome score at time t of individual i. "*Int*" "*Shift*" and "*Time*" are the latent growth factors used to capture the growth parameters and intervention effects on these growth parameters. "*Int*" represents the initial status at the anchor time point, i.e., the pretest. Because it is always coded as "1", it can be omitted from the model equations. "*Shift*" represents the shift of the mean score at the posttest associated with the intervention (Singer and Willett 2003). "Time" is associated with the linear growth rate for the intervention effect overtime. Significant '(shift) (group)' interaction indicates the group difference of the magnitudes of shift at posttest and significant (time) (group) interaction indicates the group difference of the linear growth rate. e_{ti}, r_0, r_1, and r_2 are the random effects.

Table 4 shows the findings from the growth curve modeling, including the regression coefficients and standard errors (in parentheses) of the parameters included in the mixed model equation. The results showed significant intervention effects for both LIH and ES groups on depression symptoms (CES-D) and global assessment of functioning (CGAS). Both outcomes had growth patterns following Model 2, such that there was a downward shift for CES-D and an upward shift for CGAS from pretest to posttest and the changes were sustained over time. The linear growth rate was not significant on any of the other outcome variables. None of the '(shift) (group)' and '(time) (group)' interactions were significantly different which indicated that the intervention effects were similar across the two groups.

We further examined the clinical significance of the improvement on CES-D and CGAS for each of the post-intervention assessments for the LIH and ES groups separately, using the reliable change (RC) index and following the procedures outlined by Jacobson and Truax (1991). The index identifies the individual scores that reliably changed from pretest to post-intervention. The RC is a function of the standard deviation and the reliability for the variable of interest. We used the pretest Cronbach's coefficient alpha for the reliability measure of CES-D. The reliability measure for CGAS was set conservatively at 0.80. Jacobson and Truax (1991) suggested that an RC larger than 1.96 would unlikely occur without actual improvement. Table 5 shows the percentage of the RC scores that exceed the cutoff of 1.96 for CES-D and CGAS for each post-intervention assessment. The rates of improvement were comparable between LIH and ES groups and were all above 50%. Finally, at post-intervention over 80% of participants' scores on the CES-D in each group moved into the "normal" range (i.e., less than 16).

Discussion

Study results suggest that brief interventions designed to prevent postpartum depression for American Indians and delivered by AI paraprofessionals may reduce depressive symptoms

and improve functioning over time. While this study was small in scope and requires replication, the findings highlight the potential of prevention efforts to ameliorate the psychological and economic costs associated with postpartum depressive disorders in high risk populations. Specific findings and implications for future research are discussed below.

Depressive Symptomotology and Diagnoses

The current study contributes to a growing literature showing that psychosocial interventions have the potential to reduce depressive symptoms. Contrary to the study hypothesis, however, women in both interventions showed equal rates of reduction in depressive symptoms. Specifically, young women in both groups showed a drop of between 7 and 15 points on the CES-D, and few women met criteria for postpartum depression (0% in LIH and 6% in ES). The magnitude of change in depressive symptoms was similar to that found in other studies with AIs (e.g., Barlow et al. 2006).

There are several potential explanations for the lack of group differences. First, it may be that both interventions were equally effective in reducing depressive symptoms, though they may have reduced depressive symptoms in different ways. For instance, in the ES condition, providing information about pregnancy may have increased teens knowledge, optimism, and sense of control over outcomes which may have in turn lowered their depressive symptoms. In the CBT intervention, psychoeducation about depression, increasing pleasurable activities and cognitive restructuring—all skills that target core symptoms of depression—may have reduced depressive symptoms. Alternatively, non-specific therapeutic factors (e.g., an empathic listener) experienced through the presence of a weekly visit from a caring FHE may have led to reductions in depression. Also possible, and consistent with other published trials comparing two active interventions which have failed to show group differences on self-report measures of depressive symptoms (e.g., Zlotnick et al. 2006), is that neither intervention had an impact and that the reductions in depressive symptoms over time reflect a natural course. Heron et al. (2004) in one of the largest studies to examine the course of depressive (and anxiety) symptoms over pre- and postnatal periods found that among women in a community sample, the majority reported moderately stable levels of depressive symptoms (based on the EPDS) over time (correlations ranged from 0.49 to 0.63), though decreases were noted from pre to postpartum. However, among those who scored above the clinical cut-off on at least one postnatal assessment (again using the EPDS) 44% of these cases were “new,” that is, did not score in the clinical range during their pregnancy. These patterns raise the possibility that prenatal interventions reduce depressive symptoms or prevent increases in depressive symptoms that would be expected to occur naturally.

Global Functioning and Social Support

Similar to patterns found on measures of depressive symptoms, both groups showed similar and significant improvement on a measure of global functioning. This finding strengthens the credibility of both interventions improving the lives of these young women. In contrast, neither group showed changes on the measure of social support. One potential reason for this unexpected result is that the measure of social support used in this study only assessed the degree to which participants felt supported by other people in their life. It is possible that given the realities of life on the reservation and the isolation that some women experience, neither intervention, which was delivered to each woman individually, could impact the number of supports or degree of satisfaction with social supports in these women's lives. As social support has been found to be a protective factor for many mental and physical health outcomes, alternative interventions (e.g., group formats) to improve social support may be needed.

Limitations

The results of this study should be interpreted in the context of several limitations. The sample size was small, limiting power to detect small intervention effects, which are more common in prevention trials, and restricted the number and type of analyses that could be performed, including the examination of moderators and mediators of intervention response. The absence of independent evaluators to assess primary outcomes (and reliance on primarily self-reports) and the use of measures that may not have fully captured or been consistent with Apache experiences of depression may have restricted measureable changes in outcomes. Comparisons between the two groups on key baseline demographic and clinical characteristics indicated that randomization was successful, minimizing threats to internal validity and increasing confidence in the main findings. However, the high attrition rates raise a concern that the interventions were not meeting the participants' needs or were too demanding. The FHEs believed that the mothers who dropped out tended to have less support from partners and family members, more exposure to drugs and alcohol, and difficulty maintaining scheduled lessons compared with those who stayed in the study. In addition, given that women in both groups showed improvements, the absence of a no intervention or usual care control group prohibits researchers from examining the natural course of depressive symptoms and functioning over this time period. Finally, any mother who scored in the clinical range for depression were referred to a local mental health provider, although they remained in the trial. Hence, it is not clear whether the interventions themselves or the linkages to community mental health care reduced depressive symptoms in this sample.

Implementation Challenges of Delivering Preventive Interventions to Expectant Reservation-Based AIs

Several challenges were encountered during the implementation of the study. The training was lengthy and there was at times cross-cultural misunderstanding about the terms. The FHEs reported that the LIH content was sometimes unnatural for the participants to relate to and comprehend. For example, terms such “depression” lacked relevancy and familiarity to participants and their families. In addition, the flow of teaching was impeded because the FHEs struggled to put the language and content in terms that would resonate with participants. However, because this area of intervention was new, and the investigators were trying to maintain fidelity to the key components of the intervention, the FHEs were trained to adhere strictly to the LIH curriculum. In future studies, we have tried to strike a better balance in training FHEs on key components but allowing flexibility to build relationships with the participants and adjust concepts, terms and flow of home-visiting lessons to meet participants' cognitive, cultural and linguistic preferences. Perhaps the biggest challenge to implementing this study related to the challenges of the study participants: the adolescent AI mothers had competing priorities (school, peers, partners, family members), were transient, and were often difficult to track down after initial contact was made. For example, they moved frequently, i.e., from boyfriend's parents' home to their own parents' home, and could be difficult to engage due to a myriad of distractions. It was also common for FHEs to go to a participants' home for a scheduled appointment and have no one answer the door. Direct telephone access was also limited among the study participants, so that appointments generally could not be confirmed in advance.

Clinical Implications and Conclusions

Overall, results suggested interventions delivered during pregnancy to “at risk” adolescents and young women have the potential to lower symptoms of depression. The magnitude of change in depressive symptoms was similar to those found in other studies (Barlow et al. 2006) and appeared to be clinically meaningful in that the majority of women's scores on the CED-D moved into the normal range from pre to post intervention. However, additional

research is needed to understand the natural course of depressive symptoms throughout the perinatal period among the White Mountain Apache and other AI populations in order to attribute measured changes to the interventions. Replication with a larger sample, a no intervention control condition, blinded evaluators, and a longer follow-up is also needed. The current study contributes to the literature in that it is the first published randomized controlled trial attempting to reduce the incidence of postpartum depression among American Indians. It also adds to the increasing literature that American Indian paraprofessionals may play an important future role in addressing urgent behavioral and mental health disparities in their communities. (Walkup et al. 2009; Novins 2009).

Acknowledgments

The authors thank the White Mountain Apache women who participated in this study and the White Mountain Apache leaders and community stakeholders who generously contributed their time and wisdom to designing the intervention and research protocol and reviewing the article. This study was funded by an NIMH grant (MH071300, G. Ginsburg, PI).

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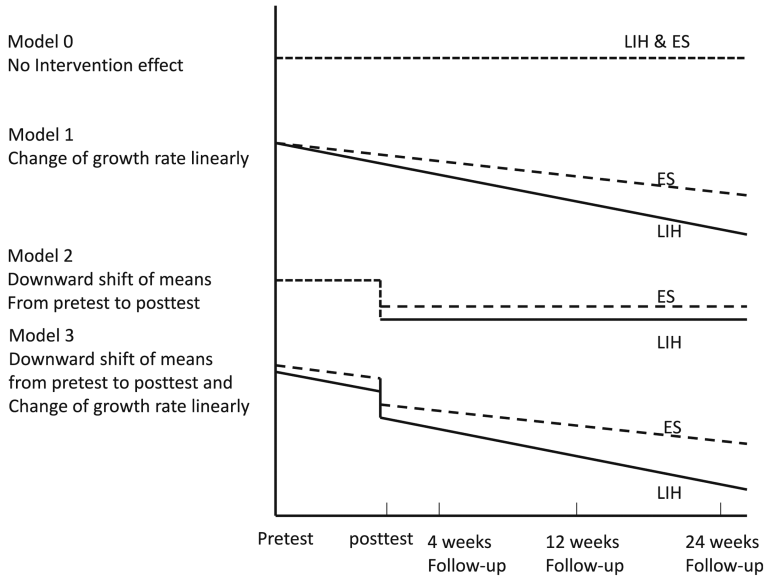

Fig. 1. Growth curve models of intervention effects

Table 1

Sociodemographic characteristics

	LIH (*N* = 22)	ES (*N* = 25)
Age (years) [mean (SD), range]	18.00 (1.90), 15–21	18.28 (1.65), 15–21
Gestational age (weeks) [Mean (SD), range]	18.71 (8.43), 3–32	20.35 (4.92), 10–28
Currently in school (%)	40.9	20.0
Currently married (%)	13.6	4.0
Living with boyfriend/spouse (%)	31.8	44.0
Living with parents (either own parents or partner's parents) (%)	68.2	60.0
Currently employed (%)	0	8.0
Already have children (%)	22.7	24.0

* $p<0.05$,

** $p<0.005$

Child Youth Care Forum. Author manuscript; available in PMC 2012 June 12.

Table 2

Mean scores (and SD) on depression measures

	Group				Cohen's d^a
	LIH		ES		
	n	*M* (SD)	*n*	*M* (SD)	
CES-D					
Pre	22	22.00 (8.28)	25	21.44 (7.38)	
Post	12	11.42 (3.60)	22	11.45 (7.24)	0.05
4 weeks	13	11.54 (8.26)	22	14.02 (10.10)	0.22
12 weeks	13	15.54 (9.41)	21	14.90 (9.17)	0.08
24 weeks	15	15.40 (9.33)	19	10.89 (6.56)	0.08
EPDS					
Pre	22	9.32 (5.96)	25	8.44 (5.76)	
Post	12	8.50 (3.85)	21	7.66 (4.22)	0.11
4 weeks	13	7.54 (4.63)	22	7.68 (4.76)	0.03
12 weeks	13	6.38 (5.64)	21	5.43 (4.23)	0.22
24 weeks	15	8.40 (6.39)	19	6.42 (4.21)	0.13
MDD (*n*/%)					
Pre	0		0		
Post	12	0	20	1 (5%)	
4 weeks	13	0	20	0 (0)	
12 weeks	13	0	20	0 (0)	
24 weeks	13	0	16	1 (6%)	

$^{*}p < 0.05$,

$^{**}p < 0.005$

[a]The column presents the estimate of the standardized effect size, Cohen's d, calculated using procedures described by Rosenthal (1994), $t\,(n_1+n_2) / \left(\sqrt{df}\right)\left(\sqrt{n_1 n_2}\right)$, where *t* was the *t*-statistics from the ANCOVA with multiple imputations; n_1 and n_2 were the sample sizes for the LIH and ES, respectively; and *df* was the degree of freedom

Table 3

Mean scores (and SD) on social support and global functioning

	Group				Cohen's *d*[a]
	LIH		ES		
	n	*M* (SD)	*n*	*M* (SD)	
Social support					
Pre	22	53.82 (17.64)	25	60.72 (16.33)	
Post	13	53.38 (18.04)	22	53.64 (18.20)	0.07
4 weeks	13	51.00 (18.80)	22	59.45 (16.79)	0.06
12 weeks	13	54.00 (19.92)	21	56.86 (19.22)	0.21
24 weeks	15	56.07 (16.39)	19	62.84 (23.58)	0.07
CGAS					
Pre	20	59.05 (10.72)	22	57.55 (8.06)	
Post	11	67.55 (9.09)	20	64.05 (5.71)	0.16
4 weeks	12	63.92 (16.09)	20	68.35 (7.26)	0.25
12 weeks	10	68.10 (12.80)	16	66.06 (9.36)	0.11
24 weeks	14	67.93 (12.74)	17	69.35 (10.75)	0.09

*$p<0.05$,

**$p<0.005$

[a]The column presents the estimate of the standardized effect size, Cohen's d, calculated using procedures described by Rosenthal (1994), $t\,(n_1+n_2)\,/\left(\sqrt{df}\right)\left(\sqrt{n_1 n_2}\right)$, where t was the t-statistics from the ANCOVA with multiple imputations; n_1 and n_2 were the sample sizes for the LIH and ES, respectively; and df was the degree of freedom

Table 4

Program effects overtime

Regression coefficients	CES-D	EPDS	SSI	CGAS
Intercept (β_{00})	21.70 (1.20)	8.85 (0.70)	57.49 (2.54)	58.28 (1.46)
Shift (β_{10})	−4.13 (1.04) **	−0.41(0.60)	−2.98 (2.15)	3.16 (1.24) **
Time (β_{20})	−0.10 (0.36)	−0.23 (0.22)	1.16 (0.81)	0.53 (0.47)
Shift × group (β_{11})	−1.10 (1.41)	−0.07 (0.81)	1.14 (3.30)	0.09 (1.63)
Time × group (β_{21})	0.63 (0.51)	0.14 (0.31)	−0.55 (1.28)	−0.07 (0.67)

For each variable, the numbers indicate unstandardized regression coefficient (standard error) of the parameter

** $p<0.01$

Table 5
Percentage of the Reliable Change Index Exceeded the Cutoff

	LIH (%)	ES (%)
CES-D		
Post	83	72
4 weeks	69	55
12 weeks	53	52
24 weeks	53	68
CGAS		
Post	77	68
4 weeks	68	88
12 weeks	81	76
24 weeks	77	84