Published in final edited form as:

Women Health. 2011 August 31; 51(6): 525–545. doi:10.1080/03630242.2011.606355.

The prevalence and correlates of depressive symptoms among adolescent mothers: results from a 17-year longitudinal study

Amelia R. Gavin, Taryn Lindhorst, and Mary Jane Lohr

University of Washington, School of Social Work, 4101 15th Avenue NE, Box 354900, Seattle, Washington, 98105

Abstract

Objectives—To examine the prevalence and correlates of elevated depressive symptoms in a 17-year cohort study of 173 women who were unmarried, pregnant adolescents between June 1988 and January 1990.

Methods—Multiple logistic regression was used to estimate the associations between correlates and elevated depressive symptoms during five distinct developmental periods of the life course. Depressive symptoms were measured by the Brief Symptom Inventory depression subscale.

Results—The prevalence of elevated depressive symptoms in adolescent mothers significantly increased over the 17 years of the study from 19.8 % to 35.2%. In adjusted analyses, antenatal depressive symptoms were positively and significantly associated with elevated depressive symptoms at every developmental period. Intimate partner violence (IPV) was positively and significantly associated with elevated depressive symptoms at all but one developmental period. Other significant correlates of elevated depressive symptoms included welfare receipt, smoking and parity – all of which were significant at some, but not other, developmental periods.

Conclusions—Antenatal depressive symptoms and IPV were positively and significantly associated with elevated depressive symptoms. Given the public health consequences associated with maternal depression, clinical and community-based interventions should be developed to identify and to treat adolescent mothers at-risk for antenatal depression and IPV.

INTRODUCTION

Early transitions to motherhood have been associated with a wide-range of short-term negative outcomes, including adverse birth outcomes (Chen et al., 2007; Fraser et al., 1995), early departure from school (Fletcher & Wolfe, 2008), shorter birth intervals (Klein, 2005), and teen parenthood in subsequent generations (Haveman et al., 1997). Despite this evidence, other research has revealed that maternal age is not solely responsible for the negative life circumstances of adolescent mothers (Oxford et al., 2006; Edin & Kefalas, 2005; Kalil & Kunz, 2002; Furstenberg et al., 1987). In many U.S. studies, after adjusting for pre-childbearing risk factors (parental socioeconomic status, race/ethnicity, childhood poverty, academic achievement), adolescent mothers have been shown to be as likely as older mothers to deliver and to raise healthy, successful children (Gueorguieva et al., 2001; Reichman & Pagnini, 1997; Geronimus & Korenman, 1993). These findings suggest that pre-childbearing characteristics, not maternal age, contribute to both adolescent motherhood and later adulthood disadvantage (Edin & Kefalas, 2005; Smithbattle, 2000; Geronimus & Korenman, 1993; Geronimus, 1991; Furstenberg, 1991).

Despite the role of pre-childbearing characteristics in reducing the adverse effects of adolescent childbearing, adolescent motherhood remains a risk factor for adverse outcomes among certain young mothers (Ramos-Marcuse et al., 2010; Pawlby et al., 2009; Deal & Holt, 1998). One factor that has been identified as having a negative effect on both mothers

and their offspring is maternal depression (Hasin et al., 2005; Carter et al., 2001; Field, 2000; Cummings & Davies, 1994). Depression is a frequently occurring illness that is more prevalent among certain groups, including women (Hasin et al., 2005; Lorant et al., 2003). Depression can be chronic or episodic. Furthermore, a majority of those with the illness experience relapses and recurrences, with earlier episodes linked to stressors and subsequent episodes appearing more spontaneously (Nierenberg et al., 2003). The population most at risk for depressive disorders is women of childbearing age because the onset of depression is often intertwined with reproductive events (Melville et al., 2010). Approximately 14.5% of women have a new episode of depression during pregnancy (Gaynes et al., 2005). A national study, using 2001–2002 data from the National Epidemiologic Survey on Alcohol and Related Conditions, reported the 12-month prevalence of *DSM-IV* major depression was 8.1% in non-pregnant women, 8.4% in pregnant women and 9.3% in postpartum women (Vesga-Lopez et al., 2008). In another study, the 12-month prevalence of major depression was 6.8% for non-pregnant women (Hasin et al., 2005). Despite the higher prevalence of major depression among women in the perinatal period, fewer pregnant and postpartum women (14.3% and 15.0%, respectively) reported seeking mental health treatment compared with non-pregnant women (25.5%) (Vesga-Lopez et al., 2008).

Among adolescents, depressive disorders are of particular concern. For adolescents and young adults, depressive disorders are associated with poor health, poor behavioral outcomes, and lower academic achievement (Saluja et al., 2004; Deal & Holt, 1998). Notably the prevalence of depressive symptoms is higher among adolescent mothers than among non-adolescent mothers. Data from a nationally-representative sample of mothers, on average 17 months postpartum, revealed adolescent mothers (15–17 years) were twice as likely as adult mothers (25–34 years) to experience depressive symptoms (Deal & Holt, 1998). Figueiro and colleagues (2007) reported the prevalence of maternal depression at 2–3 months postpartum was 25.9% for adolescent mothers compared with 9.3% of adult mothers. Empirical evidence also supports that depressive symptoms among adolescent mothers persist up to four years after the delivery date (Schmidt et al., 2006).

Considering the high prevalence of depressive symptoms in adolescent mothers, several studies have examined the prevalence and persistence of depressive symptoms among this group. For example, previous studies have demonstrated that adolescent mothers reported a higher prevalence of depressive symptoms early in the postpartum period, followed by a decline in symptoms 6 to 48 months after delivery (Ramos-Marcuse et al., 2010; Schmidt et al., 2006). Despite the strength of these findings, the prevalence among adolescent mothers of depressive symptoms beyond 4 years postpartum is unknown. This is a noted limitation because maternal depression has implications for both women and their offspring throughout childhood (Pawlby et al., 2009; Pearlstein et al., 2009).

To some extent, previous studies have examined the correlates related to depressive symptoms among adolescent mothers. For example, Figueiredo et al., (2007) examined the association between sociodemographic risk factors (e.g., education, marital status, employment status) for antenatal and postpartum depressive symptoms among their sample of mothers, but did not examine the correlates separately for the adolescent mothers. One study controlled for covariates (e.g., age at delivery, parity, financial resources, education, and domestic violence) but did not statistically examine their association with postpartum depressive symptoms (Schmidt et al., 2006). Birkeland and colleagues (2005) examined the association between postpartum depressive symptoms and a set of correlates, primarily consisting of variables highly relevant to adolescent mothers (e.g., weight concerns and body dissatisfaction) as well as correlates predictive of maternal depression (e.g., parenting stress and social isolation). Despite this body of literature, many studies investigating depressive symptoms among adolescent mothers did not include variables typically shown

to be related to maternal depression in the postpartum period. For example, women who experience intimate partner violence (IPV) are at increased risk for depression (Kendall-Tackett, 2007; Bonomi et al., 2006). Before and during pregnancy, IPV has also been linked to depression in the postpartum period (Beydoun et al., 2010; Rodriguez et al., 2010; Valentine et al., 2010). Younger women (less than 20 years of age) have a higher risk for IPV during pregnancy compared to their older counterparts (Saltzman et al., 2003). Similarly, many reports have shown a link between antenatal depression and postpartum depression (Oppo et al., 2009; Leigh & Milgrom, 2008; Milgrom et al., 2008; Rich-Edwards et al., 2006; Robertson et al., 2004).

As a result of the limitations in time frames and studied risk factors, our understanding of the long-term mental health outcomes among adolescent mothers is incomplete. Prior work suggests that once a mother reports elevated depressive symptoms she is likely to continue to experience symptoms (Horowitz et al., 2009; McLennan et al., 2001). Therefore, examining the prevalence and the correlates of elevated depressive symptoms during the adolescent period through young adulthood, among a group of potentially at-risk mothers is clinically and programmatically important (Horowitz et al., 2009).

In the present study, we contribute to the existing literature by documenting the prevalence of elevated depressive symptoms and the correlates of these symptoms assessed at multiple time points into adulthood among women who first gave birth during adolescence. The goals of the study were two-fold. First, using data from a 17-year study of women who were adolescent mothers, we examined the prevalence of elevated depressive symptoms from the first month after delivery through 17 years postpartum. Second, we identified risk factors associated with elevated depressive symptoms at five distinct developmental periods: the period from adolescence through young adulthood.

METHODS

Participants

We used data from a 17-year longitudinal study of adolescent mothers. Eligibility requirements included age 17 years and younger, those who were unmarried, and those who planned to carry their pregnancies to term. Adolescent mothers were recruited from public and private hospital-based prenatal care clinics, public school alternative programs, and social service agencies in three urban counties in the northwest, and thus were likely to represent a more normative group of pregnant teens from clinical settings (Furstenberg, 1991). Recruitment procedures included advertising; so, a conventional response rate could not be calculated. However, at a large county hospital prenatal clinic, clinic protocol required all pregnant adolescents to be seen by a clinic social worker as part of clinical care. During these prenatal care appointments, the clinic social worker approached all pregnant adolescents to determine their interest in participating in the study. Using this recruitment method, the clinic social worker approached 75 adolescent to participate in the study (5 were determined to be ineligible), 70 adolescents were eligible to participate, and 53 adolescents (76%) consented to participate in the study (17 either refused or could not be located).

Procedure

Initial interviews were conducted between June 1988 and January 1990. Interviews were conducted at 6-month intervals from 6–18 months postpartum and 3.5–6 years postpartum, and at 1-year intervals from 9.5–17.0 years postpartum. Data were not collected between 1994 and 1998 due to vagaries in funding. In total, 17 waves of data were used in our analyses in which the women's mean age ranged from 14.2–34.5 years. Interviews were typically conducted in-person; telephone interviews were conducted with respondents who

had moved out of the area, averaging 11% over time. Participants were paid \$15–\$50 for their participation at each interview. These payments increased through the course of the study to minimize attrition, beginning at \$15 for the first interview and ending at \$50 for the final interval. Written informed consent was obtained for all participants. Parental or guardian consent was obtained for study respondents who were not emancipated minors when they entered the study. All study procedures and protocols were approved by the Internal Review Board of the University of Washington.

Measures

For all analyses, we collapsed the 17 assessment periods into five epochs, roughly equivalent to developmental stages during which maternal depression has been shown to adversely affect normal development in childhood and adolescence (Deave et al., 2008; Essex et al., 2001; Brennan et al., 2000).

Outcome Variable

Depressive symptoms: The outcome of interest was clinically elevated depressive symptoms measured at each interview using the Brief Symptom Inventory (BSI) depression subscale (Derogatis, 1993). The BSI is a standardized instrument with demonstrated reliability and validity and is designed to assess psychological functioning. It is a brief version of the Symptom Checklist List 90-R (SCL-90-R) (Derogatis, 1975). Participants were asked to indicate how often in the past week each of the following items bothered or distressed them: no interest in things, feeling hopeless about the future, feelings of worthlessness, thoughts of ending your life, feeling lonely, and feeling blue. Responses were scored on a five-point scale ranging from 0 (not at all) to 4 (extremely). Raw scores were converted to standardized T scores (Derogatis, 1993). To assess elevated levels of depressive symptoms, BSI scores 63 or higher were identified (Spieker et al., 2001). Those with clinically elevated depressive symptoms were assigned a score of “1,” otherwise the score was “0.” Five outcome measures were created from the scores. Each outcome measure represented a distinct developmental period. For each developmental period, a respondent received a “0” if she had no depression scores above the clinical cutoff and a “1” if she had a score above the cutoff at least once.

Correlates of Depressive Symptoms—Based on earlier studies, risk factors for depressive disorders among adolescent mothers and women of childbearing age were identified (Rodriguez et al., 2010; Pascoe et al., 2006; Rich-Edwards et al., 2006; Beeghly et al., 2003; McLennan et al., 2001; Deal & Holt, 1998).

Socioeconomic status: Indicators of socioeconomic status used in the present study included educational attainment and receipt of public assistance. Education was treated as a binary variable based on self-reported years of education (< 12 years v. ≥ 12 years). Educational attainment was determined by the highest level of education reported in the last assessment of each developmental period. Receipt of public assistance was determined by whether the respondent used welfare (Aid to Families with Dependent Children, Temporary Assistance to Needy Families) as their primary means of financial support in the past 6 months. This variable was treated as binary within each developmental timeframe.

Demographic measures: Age, race, partner status, and parity, were included as demographic measures. Age (measured in years) was determined from self-reported date of birth. Mean age was calculated for each developmental period and treated as a continuous variable. Race was measured as a binary variable from self-reported data (White v. non-White). Partner status was analyzed as a binary variable (determined by whether the respondent was married/living with a partner at the time of the last assessment in each

development period). The number of live births (parity) was determined for each developmental period and included the cumulative number of births from previous developmental periods.

Intimate partner violence: At each assessment period after respondents turned 18 years of age they were asked to provide an assessment of their experiences with intimate partner violence (IPV). Due to mandatory reporting requirements, once respondents reached aged 18 years, they were asked retrospectively about IPV since pregnancy, after which prospective data were collected. Intimate partner violence was measured with seven items from the Conflict Tactics Scale which has been used to assess family violence in numerous studies (Straus, 1988). The questions asked whether the father of the respondent's baby, her husband, or any boyfriend or sexual partner had – threatened to hit or throw something at her, threw something at her, pushed/grabbed/shoved/or slapped her, hit her with a fist/object/kicked/or bit her, beat her up, threatened her with a knife or gun, or used a knife or fired a gun at her. Responses were coded as “yes” or “no.” Any “yes” response resulted in a score of “1” on the IPV variable; no report of violence was scored “0.” The presence of IPV was determined for each developmental period.

Substance use: At each assessment period respondents were asked whether they had consumed alcohol or smoked marijuana in the prior month. The substance use measure was adapted from the Monitoring the Future Study (Johnston et al., 1988). Respondents were also asked whether they had smoked cigarettes in the past week. Alcohol/marijuana use and current smoking were assessed as binary variables. Responses were coded as “1” if respondents reported any alcohol/marijuana use or any cigarette use during each developmental period and coded “0” if no reported use.

Statistical analyses—All analyses used STATA software (STATA version 10, 2007, College Station, TX). Sample means and percentages were used to describe continuous and categorical characteristics, respectively, of the sample. The aim of the analysis was to fit explanatory models by identifying correlates for maternal postpartum depressive symptoms across 17 waves of data. First, a series of unadjusted logistic regression analyses were conducted to assess the concurrent associations between the correlates and concurrent clinically elevated depressive symptoms in each of the five developmental periods. Second, we assessed the adjusted association between the correlates measured in each of the five developmental periods and concurrent elevated depressive symptoms in each developmental period. We identified correlates *a priori* and included them in the models, regardless of significance. Chi-square tests were conducted to determine any statistically significant differences in the prevalence rates of covariates across the developmental periods. All significance tests were evaluated at the 0.05 level with two-sided tests.

RESULTS

As previously noted, we collapsed the 17 waves of data into five developmental periods, which included: the 12 months after delivery through early toddlerhood (target child aged 1 month - 1.5 years; mothers' mean age range 14.2–19.0 years); preschool (target child aged 3.5–4.5 years; mothers' mean age range 17.7–22.5 years); early childhood (target child aged 5–6 years; mothers' mean age range 19.1–24.0 years); older childhood (target child aged 9.5–11.5 years; mothers' mean age range 24.2–29.0 years); and adolescence (target child aged 15–17 years; mothers' mean age range 29.6–34.5 years).

The sample was multi-ethnic and relatively low-income. The full sample consisted of 240 adolescents who completed the initial interview and was representative of the ethnic mix of adolescent mothers in Washington State, USA at the time of the study (Washington State

Department of Health, 1996). The majority of respondents were White (53%), followed by African American (28%), Native American (6%), Asian American (3%), and “other” (10%); 8% reported Hispanic ancestry (Table 1). Retention rates ranged from 86.3% to 99.6%, with a mean of 94.3% over the entire study. We excluded those women who were missing data on one or more variables included in the study. The final sample included 173 women who had complete information on all variables at every developmental period (72% of the original sample). At enrollment, study respondents were on average 28.1 weeks pregnant (SD = 8.3, range = 3 – 42 weeks) and ranged in age from 12–17 years (M = 16.6; SD = 1). Analyses were conducted to determine whether any significant differences existed between the 173 participants included in the analyses and the 67 participants who were excluded due to missing data. A greater proportion of participants with missing data reported a greater number of live births, less than 12 years of education, and being smokers, but a lower proportion reported substance use (data not shown).

The prevalence of elevated depressive symptoms and the number of women who reported they lived with a partner increased over time (Table 1). The prevalence of smoking and substance use increased substantially over the first and second developmental periods and then remained relatively stable over subsequent periods. In contrast, the prevalence of IPV declined from a high of 67.6% in the first developmental period to 20.8% in the fifth developmental period.

Using McNemar's chi-square tests (data not shown), comparisons across each developmental period revealed that the prevalence of elevated depressive symptoms significantly increased from the first developmental period to the second developmental period ($\chi^2_{(1)} = 12.65$; $p < 0.001$). No significant differences were observed in the prevalence of depressive symptoms across other developmental periods. Also, study participants were significantly more likely to report ≥ 12 years of education between the first and second developmental periods ($\chi^2_{(1)} = 89.04$; $p < 0.001$) and between the third and fourth developmental periods ($\chi^2_{(1)} = 6.55$; $p = 0.01$). The prevalence of reporting IPV steadily decreased over time particularly between the first and second developmental periods ($\chi^2_{(1)} = 18.28$; $p < 0.001$), between the third and fourth developmental periods ($\chi^2_{(1)} = 7.00$; $p = 0.04$). The prevalence of antenatal elevated depressive symptoms among adolescent mothers in our sample was 10.4% (data not shown).

During the first developmental period (model 1: maternal mean age range 14.2–19.0 years) reporting antenatal depressive symptoms (unadjusted odds ratio (OR) = 9.50; 95% confidence interval (CI): 3.32, 27.13) was significantly and positively associated with elevated depressive symptoms, while older maternal age was significantly associated with a lower prevalence of depressive symptomatology (OR=.64; 95% CI: .44, .92) (Table 2). During the second developmental period (model 2: mean maternal age range 17.7–22.5 years), factors significantly associated with elevated depressive symptoms were: reporting antenatal depressive symptoms (unadjusted OR = 4.32; 95% CI: 1.53–12.02), concurrent IPV (unadjusted OR = 3.17; 95% CI: 1.65–6.09), concurrent smoking (unadjusted OR = 2.26; 95% CI: 1.19–4.28), and concurrent alcohol and marijuana use (unadjusted OR = 2.06; 95% CI: 1.09, 3.89). In the third developmental period (model 3: mean maternal age range 19.1–24.0 years), antenatal depressive symptoms (unadjusted OR = 2.78; 95% CI: 1.03, 7.49), concurrent IPV (unadjusted OR = 4.02; 95% CI: 2.06, 7.84), and concurrent smoking (unadjusted OR = 2.13; 95% CI: 1.12, 4.04) were significantly associated with elevated depressive symptoms. In the fourth developmental period (model 4: mean maternal age range 24.2–29.0 years), concurrent IPV (unadjusted OR = 2.39; 95% CI: 1.21, 4.69) and concurrent smoking (unadjusted OR = 2.42; 95% CI: 1.26, 4.63) were significantly associated with elevated depressive symptoms. During the final developmental period (model 5: mean maternal age range 29.6–34.5 years) antenatal depressive symptoms (unadjusted OR = 4.32; 95% CI: 1.53, 12.20), concurrent receipt of public assistance

(unadjusted OR = 3.41; 95% CI: 1.57, 7.40), concurrent IPV (unadjusted OR = 2.92; 95% CI: 1.37, 6.21), and concurrent smoking (unadjusted OR = 2.35; 95% CI: 1.24, 4.45) were significantly associated with elevated depressive symptoms.

Controlling for potential covariates, antenatal depressive symptoms were positively and significantly associated with elevated depressive symptoms at each developmental period (models 1–5), while concurrent IPV was significantly associated with clinically significant depressive symptoms in nearly all of the developmental periods (models 2–5) (Table 3). Specifically, the odds of experiencing depressive symptoms among respondents who reported depressive symptoms during their pregnancy, while continuing to be positively associated with elevated depressive symptoms, declined dramatically after the first developmental period. During periods two through four, the odds of experiencing elevated depressive symptoms among women who reported antenatal depressive symptoms was relatively stable; women with antenatal depressive symptoms had more than three times the odds of experiencing depressive symptoms compared to women who reported no antenatal depressive symptoms. Women who reported concurrent IPV had a 2-fold to 4-fold (model 1 – model 5) increased odds of experiencing elevated depressive symptoms compared to women who did not report concurrent IPV. In addition, other correlates significantly associated with elevated depressive symptoms included parity (model 2), concurrent receipt of public assistance (model 5), and concurrent smoking (model 5).

DISCUSSION

In this longitudinal cohort study of women who were adolescent mothers, we examined the prevalence of elevated depressive symptoms and identified associated risk factors over a 17-year period. From an initial level of 19.0%, postpartum elevated depressive symptoms increased steadily over time - doubling by the final developmental period of the study to 35.2% of these mothers. Having over one-third of women who were in their early 30's report elevated depressive symptoms indicates a substantial degree of mental health burden among this sample. This rate is almost five times higher than that found among women in the general population (Hasin et al., 2005). While the BSI does not generate a depression diagnosis per se, it has a long history of use for identification of psychopathology, particularly its ability to distinguish between people with a mood disorder and those with no mood disorder (Morlan & Tan, 1998; Derogatis & Melisaratos, 1983).

In comparing the prevalence of elevated depressive symptoms at each developmental period, women reported the lowest prevalence of depressive symptoms in the year and a half after the birth of their child. This finding suggests that during adolescence, the prevalence of depressive symptoms was lower than during adulthood among the mothers in our sample. This result does not correspond to those from previous studies which have shown adolescent mothers with higher rates of depressive symptoms compared to adult mothers (Figueiro et al., 2007; Deal & Holt 1998). In addition, our finding differs from the results of previous studies of adolescent mothers in which the prevalence of depressive symptoms was highest early in the first 12 months after delivery and declined over the two- to four-year period after delivery (Ramos-Marcuse et al., 2010; Schmidt et al., 2006). Three explanations are possible for the lower initial prevalence of depressive symptoms in our study of adolescent mothers. First, adolescent mothers rarely parent alone during the early years of their child's life, most young adolescent mothers live with their own mothers after the birth of their infant (Sellers et al., 2011; Oberlander et al., 2009; Spencer et al., 2000). A substantial number of adolescent mothers in our study lived in households with their own mothers in the 12 months after delivery (Spencer et al., 2000; Kalil et al., 1998), and this relationship and support may have been protective of mental health in the months after birth. Some previous findings suggest that adolescent mothers benefit from living in multigenerational

households, especially if they are able to further their education (Unger & Cooley, 1992) and acquire parenting skills (Smithbattle, 1996; Apfel & Seitz, 1991). Studies have also shown that adolescent mothers living in multigenerational households who report supportive relationships with their mothers or family members report fewer depressive symptoms (Caldwell et al., 1998; Kalil et al., 1998). For example, adolescent mothers who lived with their own mother and reported positive family cohesion were less likely to experience depressive symptoms compared with those who reported negative family cohesion (Kalil et al., 1998). Another explanation for our findings may be that changes in social support associated with moving into independent living arrangements may increase the risk of elevated depressive symptoms among older mothers compared with adolescent mothers (Schmidt et al., 2006). Finally, adolescent childbearing may initiate a process of cumulative disadvantage in which some teenage childbearers become more emotionally distressed as they make the transition to adulthood (Milan et al., 2004). Jaffe and colleagues (2001) posited that adolescent childbearing may result in a series of life events (e.g., lower educational attainment, partner instability) which may accumulate and increase the risk of mental health problems. Based on this assumption, mental health problems among adolescent mothers may not be evident until later in adulthood.

In the present study, 67.6% of adolescent mothers reported IPV during the first 18 months after delivery (mean maternal age range 14.2–19.0 years); however, the prevalence of IPV declined over time to 20.8% (mean maternal age range 29.6–34.5 years). Our findings are generally similar to earlier studies that documented the prevalence of IPV among adult women. Specifically, lifetime rates of IPV ranged from 22.1% in a nationally representative sample (Tjaden & Thoennes, 1998) to 44% among women participating in a health maintenance organization (Thompson et al., 2006). Findings from an earlier study suggest that 21.3% of adolescent mothers reported IPV at three months postpartum and 12.8% at 24 months postpartum (Harrykisson et al., 2002). Our findings are notable in that the prevalence of IPV in the first 18 months after delivery was much higher than those reported by Harrykisson and colleagues (2002) although the pattern of decline was similar in both studies. An explanation for our findings may be related to the assessment of IPV, which was retrospectively measured during the first 18 months after delivery. Harrykisson and colleagues (2002) assessed IPV at 3-month and 6-month intervals. It is therefore likely that our retrospective measure produced higher rates because of the longer period it assessed.

We also found that the risk factors associated with elevated depressive symptoms revealed a specific pattern of association. After controlling for significant covariates, antenatal depressive symptoms were a consistently significant predictor of elevated depressive symptoms at each developmental period over a 17-year period. This finding is similar to previous studies which suggest the long-lasting role of the initial occurrences of depressive episodes in later symptomatology (Stueve et al., 1998; Perris, 1984). Researchers have postulated that both sensitization to stressors and episode sensitization may leave residual traces and increase vulnerability to further depressive episodes. Substantial evidence supports this line of inquiry. Findings from previous studies revealed that antenatal depression is associated with depression in the postpartum period (Oppo et al., 2009; Leigh & Milgrom, 2008; Milgrom et al., 2008; Robertson et al., 2004). A history of depression has been shown to be strongly related to future depression (American Psychiatric Association, 1994). Leading researchers note that women over the age of 30 years may have the highest prevalence of recurrent depression (Marcus et al., 2001). This age-related risk is linked to the onset of depression early in the childbearing years. As a result, women are subjected to longer periods of exposure to recurrences (Bonomi et al., 2006). Our findings add to the literature, highlight the chronic nature of depressive symptoms in this population, and provide evidence for the need for screening and targeted interventions to treat depression during the antenatal period.

Our data indicated that adolescent mothers who reported abuse experienced a 2-fold to 4-fold increased odds of elevated depressive symptoms over time. This finding is largely consistent with those of other studies that have reported the detrimental effect of IPV on depression (Coker et al., 2002; Golding, 1999). Although the observational research design of this study precludes us from establishing causality, our data are strongly suggestive and there is other evidence that IPV is causally linked to depression (Golding, 1999). For example, among abused women, the first episode of depression has been linked with the beginning of an abusive relationship (Campbell & Soeken, 1999). Previous research has also shown that 83% of abused women who had just left a domestic abuse shelter reported depressive symptoms. For those women who ended their abusive relationship, the prevalence of depressive symptoms at 6 month decreased to 49% (Campbell et al., 1995). Finally, studies have shown that women exposed to IPV experienced elevated rates of depressive symptoms compared to women who were not exposed to IPV (Rodriguez et al., 2010; Rodriguez et al., 2008; Lindhorst & Oxford, 2008; Bonomi et al., 2006).

Our results must be viewed in light of several limitations. First, we measured depressive symptoms using a self-report depression screening instrument, which may not capture important aspects of depressive symptoms. Second, the sample was drawn from a single geographic area of the U.S. Although the sample appears representative of those adolescents who gave birth in the area, we do not know to what extent the findings generalize to adolescent mothers in other regions of the U.S. Finally, the prepregnancy depressive history in this sample of women is unknown. Adolescent mothers with a history of mood disorders may have been more likely to report depressive symptoms in the postpartum period.

Despite these limitations our study had a number of strengths. To our knowledge, this is the first study that used longitudinal data that were of significantly greater length (across 17 years of the respondents' lifespan) than other mental health studies, especially pertaining to a high risk group, such as adolescent mothers. Second, our study recruited adolescent mothers from the community rather than from clinical settings typically used to recruit these mothers. The women in this study are, therefore, likely to represent a more normative group of adolescent mothers than would be found in a clinical sample. Third, the measures of depressive symptoms, IPV, and substance use used in this study have been used in many other studies, thereby increasing the validity of our findings.

CONCLUSIONS

The results of this study revealed that high levels of elevated depressive symptoms were associated with antenatal depression and IPV over time among women who were adolescent mothers. Numerous studies have documented the long-term, negative effects of depression and IPV on a myriad of outcomes among women and their families (Tollestrup et al., 1999; Campbell & Lewandowski, 1997; Sternberg et al., 1993). In light of the enormous public health impact of antenatal depression and IPV for mothers and their children, targeted interventions during adolescence may reduce the long-term sequelae of depressive symptoms among women who are adolescent mothers.

Acknowledgments

This research was supported by the grants DA05208 from the National Institute on Drug Abuse, and MH52400 and 1K01MH72827-01A from the National Institute of Mental Health and 1KL2RR025015-01 from the National Center for Research Resources (NCRR). Its contents are solely the responsibility of the authors and do not necessarily represent the official view of NCRR or NIH.

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Table 1

Distribution of maternal sociodemographic and health characteristics assessed at each developmental period

	Developmental period (duration of period, in years)				
	Period 1 (maternal age 14.2–19.0 yrs)	Period 2 (maternal age 17.7–22.5 yrs)	Period 3 (maternal age 19.1–24.0 yrs)	Period 4 (maternal age 24.3–29.0 yrs)	Period 5 (maternal age 29.6–34.5 yrs)
Depressive symptoms, % (n)	19.8% (33)	35.2% (61)	33.5% (58)	34.6% (60)	35.2% (61)
Age, Mean (SD)	17.5 (1.01)	20.9 (1.01)	22.4 (1.02)	27.4 (1.02)	32.9 (1.01)
White, % (n)	52.0% (90)	52.0% (90)	52.0% (90)	52.0% (90)	52.0% (90)
Living with partner, % (n)	32.3% (56)	45.6% (79)	50.8% (88)	62.4% (108)	58.3% (101)
≥ 12 years education, % (n)	16.1% (28)	68.7% (119)	73.4% (127)	80.3% (139)	84.3% (146)
Received welfare, % (n)	14.4% (25)	46.2% (80)	33.5% (58)	2.3% (4)	8.6% (15)
Intimate partner violence, % (n)	67.6% (117)	47.4% (82)	41.6% (72)	29.4% (51)	20.8% (36)
Parity, Mean (SD)	1.19 (.42)	1.79 (.74)	2.02 (.79)	2.72 (1.03)	3.01 (1.21)
Smoking, % (n)	27.1% (47)	42.7% (74)	44.5% (77)	36.4% (63)	42.2% (73)
Alcohol, marijuana use, % (n)	9.8% (17)	41.0% (71)	42.2% (73)	41.0% (71)	33.5% (58)

Table 2

Unadjusted odds ratios (and 95% confidence intervals [CI]) for associations between maternal sociodemographic, health characteristics and depressive symptoms measured during each developmental period^f

Correlates of depressive symptoms	Model 1 ^a OR (95% CI)	Model 2 ^b OR (95% CI)	Model 3 ^c OR (95% CI)	Model 4 ^d OR (95% CI)	Model 5 ^e OR (95% CI)
Antenatal depressive symptoms	9.5 (3.32, 27.13)	4.32 (1.53, 12.02)	2.78 (1.03, 7.49)	2.65 (0.97, 7.05)	4.32 (1.53, 12.20)
Age ^h	0.64 (0.44, 0.92)	1.07 (0.78, 1.46)	0.98 (0.72, 1.33)	0.91 (0.67, 1.24)	0.98 (0.72, 1.34)
Race (White) ^h	0.83 (0.39, 1.79)	1.54 (0.82, 2.90)	0.88 (0.47, 1.66)	1.20 (0.64, 2.25)	1.02 (0.55, 1.91)
Living with partner ^h	0.88 (0.39, 2.02)	0.82 (0.44, 1.55)	0.85 (0.45, 1.60)	0.76 (0.40, 1.45)	0.68 (0.36, 1.29)
≥ 12 years education ^h	0.46 (0.13, 1.62)	1.00 (0.51, 1.97)	0.92 (0.45, 1.88)	0.60 (0.28, 1.30)	0.44 (0.19, 1.01)
Receipt of public assistance ^h	1.41 (0.51, 3.87)	0.71 (0.38, 1.35)	1.81 (0.91, 3.60)	1.14 (0.52, 2.47)	3.41 (1.57, 7.40)
Intimate partner violence ^h	2.00 (0.80, 4.93)	3.17 (1.65, 6.09)	4.02 (2.06, 7.84)	2.39 (1.21, 4.69)	2.92 (1.37, 6.21)
Parity ^h	0.56 (0.19, 1.65)	1.29 (0.85, 1.97)	1.42 (0.95, 2.11)	1.06 (0.78, 1.43)	0.92 (0.70, 1.19)
Smoking ^h	1.21 (0.52, 2.78)	2.26 (1.19, 4.28)	2.13 (1.12, 4.04)	2.42 (1.26, 4.63)	2.35 (1.24, 4.45)
Alcohol, marijuana use ^h	0.90 (0.24, 3.33)	2.06 (1.09, 3.89)	1.01 (0.46, 2.20)	1.93 (0.73, 5.11)	0.79 (0.37, 1.66)

^aCorrelates of maternal depressive symptoms measured in period 1 (mean maternal age 14.2–19.0 yrs)

^bCorrelates of maternal depressive symptoms measured in period 2 (mean maternal age 17.7–22.5 yrs)

^cCorrelates of maternal depressive symptoms measured in period 3 (mean maternal age 19.1–24.0 yrs)

^dCorrelates of maternal depressive symptoms measured in period 4 (mean maternal age 24.3–29.0 yrs)

^eCorrelates of maternal depressive symptoms measured in period 5 (mean maternal age 29.6–34.5 yrs)

^fOutcome variable: elevated depressive symptoms (assessed using the clinical cutoff of ≥ 63 on the Brief Symptom Inventory) measured at each developmental period

^hEach correlate was assessed during the concurrent period

Table 3

Adjusted odds ratios (and 95% confidence intervals [CI]) for associations between maternal sociodemographic, health characteristics and depressive symptoms measured during each developmental period^f

Correlates of depressive symptoms	Model 1 ^a OR (95% CI)	Model 2 ^b OR (95% CI)	Model 3 ^c OR (95% CI)	Model 4 ^d OR (95% CI)	Model 5 ^e OR (95% CI)
Antenatal depressive symptoms	14.80 (4.38, 50.02)	4.42 (1.42, 13.75)	3.59 (1.16, 11.05)	3.38 (1.16, 9.84)	4.82 (1.54, 15.11)
Age ^h	0.64 (0.41, 1.01)	1.18 (0.80, 1.74)	1.07 (0.74, 1.53)	0.95 (0.67, 1.33)	1.24 (0.85, 1.78)
Race (White) ^h	0.92 (0.35, 2.41)	1.79 (0.85, 3.77)	1.14 (0.54, 2.43)	1.46 (0.71, 3.02)	1.70 (0.79, 3.65)
Living with partner ^h	0.71 (0.26, 1.97)	0.58 (0.25, 1.33)	0.71 (0.33, 1.54)	0.81 (0.38, 1.65)	0.82 (0.39, 1.72)
≥ 12 years education ^h	0.39 (0.12, 1.21)	0.97 (0.43, 2.19)	1.71 (0.71, 4.12)	0.62 (0.26, 1.44)	0.49 (0.18, 1.30)
Receipt of public assistance ^h	1.94 (0.60, 6.31)	0.60 (0.27, 1.32)	1.31 (0.60, 2.85)	2.60 (0.29, 23.11)	6.76 (1.65, 27.67)
Intimate partner violence ^h	2.82 (0.95, 8.32)	3.02 (1.46, 6.27)	4.30 (2.04, 9.07)	2.53 (1.22, 5.28)	2.93 (1.22, 6.98)
Parity ^h	0.61 (0.18, 2.08)	1.58 (0.96, 2.58)	1.98 (1.19, 3.29)	1.09 (0.77, 1.55)	0.88 (0.63, 1.22)
Smoking ^h	1.20 (0.39, 3.74)	1.89 (0.90, 3.97)	1.98 (0.95, 4.14)	1.92 (0.94, 3.93)	2.61 (1.27, 5.33)
Alcohol, marijuana use ^h	1.53 (0.31, 7.57)	1.42 (0.65, 3.11)	1.54 (0.69, 3.43)	1.37 (0.66, 2.83)	1.08 (0.51, 2.31)

^aCorrelates of maternal depressive symptoms measured in period 1 (mean maternal age 14.2–19.0 yrs)

^bCorrelates of maternal depressive symptoms measured in period 2 (mean maternal age 17.7–22.5 yrs)

^cCorrelates of maternal depressive symptoms measured in period 3 (mean maternal age 19.1–24.0 yrs)

^dCorrelates of maternal depressive symptoms measured in period 4 (mean maternal age 24.3–29.0 yrs)

^eCorrelates of maternal depressive symptoms measured in period 5 (mean maternal age 29.6–34.5 yrs)

^fOutcome variable: elevated depressive symptoms (assessed using the clinical cutoff of ≥ 63 on the Brief Symptom Inventory) measured at each developmental period

^hEach correlate was assessed during the concurrent period