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The Role of Sexual Abuse and Dysfunctional Attitudes in Perceived Stress and Negative Mood in Pregnant Adolescents: An Ecological Momentary Assessment Study

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Abstract

Study Objective—Latinas have the highest rates of adolescent pregnancy in the US. Identifying means to improve the well-being among these young women is critical. The current study examined whether a history of child sexual abuse — itself a risk factor for adolescent pregnancy — was associated with more perceived stress and negative mood over the course of pregnancy and whether dysfunctional attitudes explained these associations.

Design and Setting—This mixed methods study involved lab-based assessments of perceived stress, sexual abuse history, and dysfunctional attitudes as well as Ecological Momentary Assessments (EMA) of mood states every 30 minutes during a 24-hour period once during each trimester of pregnancy.

Participants—Pregnant adolescents (n = 204, 85% Latina).

Main Outcome Measures—EMA mood states and lab-based retrospective self–reports of perceived stress.

Results—One in four pregnant adolescents had a history of sexual abuse. Sexually abused adolescents reported greater perceived stress during the first trimester relative to those without, though the groups did not differ on EMA negative mood ratings. Dysfunctional attitudes explained associations between sexual abuse and perceived stress. Sexual abuse was indirectly associated with the intercept and slope of negative mood through dysfunctional attitudes. Findings were circumscribed to sexual abuse and not other types of child abuse.

Conclusions—Identifying sexually abused pregnant adolescents and providing support and cognitive therapy to target dysfunctional beliefs may decrease stress during the first trimester as well as negative affect throughout pregnancy.

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Keywords

adolescent pregnancy; child sexual abuse; dysfunctional attitudes; perceived stress; negative mood; ecological momentary assessment

Introduction

Although adolescent pregnancy in the United States has declined significantly[1], the US continues to have the highest rate of all industrialized nations[2,3]. Rates of adolescent pregnancy are three times higher among Hispanic compared to white adolescents[1], and, independent of race and ethnicity, adolescent pregnancy is associated with increased risk for negative birth outcomes (e.g., preterm birth and lower birth weight)[4–6]. Identifying factors that may improve the health and well-being of Hispanic adolescent mothers–to–be has significant public health relevance.

Compared to their peers, pregnant adolescents are more likely to have a history of adverse childhood events[7] including childhood sexual abuse (CSA)[8]. Although CSA may increase risk for adolescent pregnancy, few studies have examined how CSA impacts adolescents *during* pregnancy. According to traumagenic dynamics theory[9], CSA could negatively impact pregnant adolescents by engendering negative thinking patterns or attitudes that increase risk for mood or anxiety disorders. CSA victims have negative attributions of events that are more internal, stable, and global than do non-victims[10], and victims of more severe CSA tend to endorse more self-blame attributions relative to victims of less severe CSA[11,12]. CSA victims also report more dysfunctional beliefs and attitudes when compared to those without CSA[13]. However, with the exception of a study documenting associations between CSA and depression during pregnancy[14], the effects of potentially CSA–related dysfunctional beliefs and attitudes have not been studied among pregnant adolescents.

Dysfunctional beliefs and attitudes among adolescents with CSA histories could negatively impact pregnancy by increasing their stress and negative mood. Adult women with CSA histories evidence heightened negative mood and stress during pregnancy[15]. Pregnancy is an outcome of sexual relations and thus may activate fear networks associated with CSA exposure and increase the experience of stress, particularly for those with posttraumatic stress disorder (PTSD)[15]. Several studies have linked CSA to the long-term development of disorders characterized by extreme dysphoria including borderline personality disorder, PTSD, and depression[16,17]. Of the few studies focused on pregnant adolescents, one cross-sectional study found that adolescents with CSA histories scored higher on general measures of stress[18]. A study of adult women found that while external stressors remained stable throughout pregnancy, pregnancy-related stress peaked during the first and third trimesters, and anxiety peaked during the third trimester[19]. Furthermore, among adult women assessed at two time points during pregnancy, perceived stress and anxiety were not associated with increased risk for preterm birth; however, those who exhibited an increase in stress and anxiety over the course of pregnancy had shorter gestation lengths[20]. Factors that contributed to increased stress over the course of the pregnancy were not explored in that study; findings suggest the importance of identifying malleable individual difference

variables, including CSA history or dysfunctional attitudes, that could contribute to increases in stress or negative mood over the course of pregnancy.

The current study

Although a burgeoning body of research has documented the impact of maternal stress during pregnancy on poor birth outcomes[21–24], few studies have examined individual difference factors that could contribute to variability in maternal stress during pregnancy, and far fewer studies have focused on these associations in pregnant adolescents. A history of CSA is one individual difference factor that may elevate risk for psychological distress during pregnancy, perhaps through the development and maintenance of dysfunctional beliefs and attitudes that increase perceived stress and negative mood. The current study used data from a sample of pregnant, primarily Latina adolescents to examine whether a history of CSA was associated with more perceived stress and daily negative mood during repeated ecological momentary assessments (EMA) over the course of pregnancy. We collected data on a broad range of child maltreatment experiences as child maltreatment types are known to co-occur[25]; thus we also tested whether the observed associations were circumscribed to CSA or whether they extended to other forms of maltreatment. We also examined whether dysfunctional beliefs and attitudes explained associations between CSA history and changes in stress and negative mood over the course of pregnancy. Compared to non-victims, pregnant adolescents with CSA histories were expected to report more dysfunctional attitudes as well as greater perceived stress and increased negative mood initially and over the course of the prenatal period. It also was expected that dysfunctional attitudes would account for associations between CSA and trajectories of perceived stress and negative mood over time.

Material and Methods

Overall design

Participants were drawn from a prospective longitudinal observational study of pregnant adolescents measured at three time points: early (13–16 weeks), middle (24–27 weeks), and late (34–37 weeks) pregnancy. Participants completed the perceived stress measure during a lab-based assessment. Over a 24-hour period, mood ratings were collected using EMA, which permits in-the-moment collection of data.

Participants

Nulliparous pregnant adolescents, ages 14–19 and between 13–27 gestational weeks, were recruited through the Departments of Obstetrics and Gynecology at Columbia University Medical Center (CUMC) and Weill Cornell Medical College, and flyers posted in the CUMC vicinity. All adolescents had a healthy pregnancy at the time of recruitment. Participants were excluded if they smoked or used recreational drugs, lacked fluency in English or were multiparous. Per a separate aim of the study, participants were excluded on the basis of chronic use of the following: nitrates, steroids, systemic migraine medications, stimulants, major and minor tranquilizers; and psychiatric medications. One pregnancy ended in fetal demise; this participant was excluded from analysis. Participants were 204 pregnant adolescents (*M* age = 17.9, *SD* = 1.2, range = 14–20). Approximately 85% (*n* =

173) were Latina; 48% (n = 98) were in the 12th grade, 25% (n = 51) in the 11th, 11.8% (n = 24) in the 10th, 8.3% (n = 17) in the 9th, and 3.4% (n = 7) in the 8th grade. Thirty-five percent (n = 72) reported a total annual family income of $0–15K, 34.3% ($n$ = 70) $16–25K, 16.2% ($n$ = 33) $26–50K, 2% ($n$ = 4) $51–100K, and 0.5% ($n$ = 1) more than $100K. All participants provided written-informed consent, and all procedures were approved by the Institutional Review Board of the New York State Psychiatric Institute/Columbia University Medical Center.

Measures

Child Maltreatment History—The Childhood Trauma Questionnaire (CTQ)[26] is a 28-item self-report questionnaire that retrospectively assesses five types of childhood maltreatment: emotional, physical, and sexual abuse, and emotional and physical neglect. Each abuse type is assessed with five items measured on a Likert-type scale from 1 (never true) to 5 (very often true). Responses to the CTQ are summed, with higher scores indicating greater levels of each type of maltreatment. Numerous investigations attest to the reliability and validity of this measure[27,28]. The CTQ was administered once during pregnancy, typically during the first trimester, although 14.6% (n = 30) entered the study in their second trimester and received the CTQ during that session; victimization status according to the 5-item sexual abuse subscale was used for the primary analysis; victimization status for any other maltreatment (physical or emotional abuse or physical or emotional neglect) was used for secondary analysis. Per cutoffs in the manual[26], participants were considered CSA victims if they scored a 6 or higher on the sexual abuse subscale. Participants who scored an 8 or higher on the physical abuse or neglect subscales, a 9 or higher on the emotional abuse subscale, and a 10 or higher on the emotional neglect subscale were considered victims of those forms of maltreatment.

Dysfunctional Attitudes Scale (DAS)[29]—The DAS is a 40-item measure of cognitive distortions that relate to or cause depression. DAS items are based on Beck's cognitive therapy model and present 7 major value systems: Approval, Love, Achievement, Perfectionism, Entitlement, Omnipotence, and Autonomy. A total score is obtained by summing the items. The DAS has good internal consistency, with alphas ranging from .84 to .92[29]. The DAS also has excellent stability, with test-retest correlations over 8 weeks of .80 to .84[29]. The DAS was administered once during pregnancy, typically during the first trimester, although 14.6% (n =30) entered the study in their second trimester and received the DAS during that session.

Perceived Stress Scale—The Perceived Stress Scale[30] is a 14-item measure of the degree to which life situations during the previous month are perceived as stressful. Participants respond to items on a 5-point Likert scale ranging from 0 (never) to 4 (very often). The PSS was administered in the laboratory at the same three testing time points as EMA data were collected. Internal consistency reliability for the scale is 0.85, and the test-retest correlation is 0.85[30].

EMA Negative Mood—A personal digital assistant was provided to participants to collect current mood states every 30 minutes for 24 hour periods timed to begin with each of the

three lab assessments. Using a 5-point Likert scale (1 = low, 5 = high), participants rated 17 negative and positive mood states: cheerful, cooperative, responsible, caring, proud, friendly, productive, hard–working, lonely, nervous, angry, frustrated, competitive, strained, worried, irritated, stressed. Participants provided ratings during waking hours each time an automated ambulatory blood pressure unit initiated a read (every 30 minutes). Participants were incentivized to provide ratings, earning $.10 per rating. As described elsewhere[31], a composite negative mood score, which reflected experiencing events as straining or exceeding adaptive capacities and threatening well-being, was derived via factor analysis for each participant for each EMA session. The selected items were: angry, frustrated, irritated, stressed. A weight was created by dividing the number of diary entries at each session by the total number of diary entries across all study sessions. The average for the four items was calculated for each participant at each time point and multiplied by the weight at that session.

Statistical analyses

Preliminary descriptive analyses as well as tests of bivariate associations were computed in PASW Statistics Version 19.0. Tests of hypotheses were conducted using Mplus Version 6.0. Growth curve modeling was used to examine changes in the trajectories of perceived stress and negative mood during pregnancy. First, unconditional growth curve models were estimated separately by outcome to obtain intercept and slope fixed-effect estimates and to test for the presence of significant variance in these latent growth trajectory factors. Second, conditional growth curve models examined the influence of CSA and dysfunctional attitudes on the intercept and slope of perceived stress and negative mood during pregnancy. Data from only three time points (i.e., once each trimester) were available for analysis, thus, non-linear effects were not tested here. Time was parameterized such that the first trimester (T1) was @0; subsequent time points were parameterized as months since T1. On average, 2.6 (*SD*=0.33) months passed between T1 and T2, while 2.3 (*SD*=0.25) months passed between T2 and T3. Model fit was considered acceptable if the chi-square was non-significant, the comparative fit index (CFI) was 0.95 or greater, the root-mean-square error of approximation (RMSEA) was 0.06 or less, and the Standardized Root Mean Square Residual (SRMR) was 0.08 or less[32,33].

Missing Data

Adolescents who completed all three data collection sessions (n=61) did not differ from those who completed one or two sessions (n=143) on child abuse history, $\chi^2(1,204)= 0.46$, p=0.54, sexual abuse history, $\chi^2(1,204)= 0.03$, p=1.0, DAS, $F(1,168)=1.7$, p= 0.20, or PSS score at wave 1, $F(1,125)=.004$, p=0.95, wave 2, $F(1,124)=3.00$, p=0.09, or wave 3, $F(1,116)=1.15$, p=0.29. However, adolescents who entered the study at wave 2 compared to wave 1 had greater perceived stress, $F(1,124)=6.49$, p=0.01. Furthermore, adolescents who missed one or two sessions had higher negative mood scores at wave 1, $F(1,131)=53.8$, p<0.001, wave 2, $F(1,124)=29.9$, p<0.001, and wave 3, $F(1,118)=19.9$, p<0.001, relative to adolescents who completed all three sessions. Missing data were handled via Full Information Maximum likelihood (FIML) estimation procedures; however, because likelihood of missingness was associated with higher negative mood, sensitivity analyses

were conducted just among those who completed all three sessions to examine potential changes in findings.

Results

Descriptive Statistics

Correlations between study variables are presented in Table 1. Approximately 25% (n=50) participants reported a history of CSA. CSA victims did not differ from non-victims in mean age, $F(1,236)=0.29$, $p=0.59$, education, $\chi^2(4,233)=1.79$, $p=0.78$, race/ethnicity, $\chi^2(3,237)=0.06$, $p=0.81$, or family income, $\chi^2(4,216)=3.06$, $p=0.55$. Mean differences between CSA victims and non-victims on dysfunctional attitudes, perceived stress, and negative mood are reported in Table 2. Victims reported more dysfunctional attitudes and greater perceived stress during the first trimester relative to non-victims. Victims did not report significantly more mean daily negative mood at each wave.

Growth Curve Models

Unstandardized intercept and slope estimates and variance from unconditional models are presented in Table 2. Models fit the data well as indicated by a non-significant chi-square; CFI of 0.95 or above; RMSEA of 0.05 or less, and SRMR of 0.08 or less. Significant fixed effects for the intercept and slope of perceived stress and negative mood were observed such that the intercept was significantly greater than zero and the slope declined significantly over time for each variable.

Perceived Stress

Unstandardized intercept and slope estimates from conditional models predicting trajectories of perceived stress and negative mood also are presented in Table 3. For the model predicting perceived stress, model fit was good, $\chi^2(df=2)=0.97$, $p=0.62$, $RMSEA<0.001$, $CFI=1.0$, and $SRMR=0.03$, and CSA predicted the intercept of perceived stress, although it did not predict the slope (see Figure 1). When dysfunctional attitudes were added to the model, model fit also was good, $\chi^2(df=3)=1.27$, $p=0.74$, $RMSEA<0.001$, $CFI=1.0$, and $SRMR=0.03$, and dysfunctional attitudes predicted perceived stress while CSA became non-significant (see Table 3). Neither was associated with the slope of perceived stress over the prenatal period. CSA was positively associated with dysfunctional attitudes (*Estimate*=12.06, *S.E.*=4.69, $p=0.01$), and there was a significant indirect effect from CSA through dysfunctional attitudes to the intercept (*Estimate*=1.07, *S.E.*=.34, $p=0.013$) of perceived stress.

Negative Mood

For the model predicting negative mood, model fit was good, χ^2 ($df=2$) =3.9, $p=0.14$, $RMSEA=0.07$, $CFI=0.96$, and $SRMR=0.05$, but CSA was not associated with negative mood during pregnancy (see Figure 1). When dysfunctional attitudes were added to the model, fit remained good, $\chi^2(df=3)=4.6$, $p=0.20$, $RMSEA=0.06$, $CFI=0.95$, and $SRMR=0.05$, and dysfunctional attitudes were associated with increased negative mood at intercept, but with reduced negative mood over the prenatal period. Although CSA was not directly associated with negative mood trajectories, it was positively associated with dysfunctional attitudes

(*Estimate*= 12.49, *S.E.*=4.67, *p*=0.008), and there was a significant indirect effect from CSA through dysfunctional attitudes to the intercept (*Estimate*=0.12, *S.E.*=0.05, *p*=0.02) and slope (*Estimate*=−0.02, *S.E.*=0.01, *p*=0.04) of negative mood.

Secondary Analysis

To examine whether findings were specific to sexual abuse, secondary analyses were conducted with other forms of child abuse. Approximately 31% (*n*=64) of participants reported other child abuse; sexual abuse victims were excluded from this analysis. Victims of other child abuse did not differ significantly on age, ethnicity, education, or family income relative to non-victims. Victims of other abuse did not have more dysfunctional attitudes, perceived stress, or negative mood at any wave, thus, growth models were not examined.

Sensitivity Analysis

Because individuals with higher negative mood at each time point were less likely to complete all three study sessions, analyses were conducted among those with complete data (*n*=61) to examine whether parameter estimates changed. Consistent with findings from the larger sample, only dysfunctional attitudes contributed to the intercept of perceived stress (*Estimate*=0.08, *S.E.*=0.04, *p*=0.02), and CSA indirectly affected the intercept of perceived stress through dysfunctional attitudes (*Estimate*=1.73, *S.E.*=0.84, *p*=0.04). However, the associations between dysfunctional attitudes and negative mood that were evident in the larger sample were not significant among complete cases.

Discussion

The current study is one of the first to examine how CSA impacts perceived stress and negative mood during pregnancy in a sample of pregnant, primarily Latina adolescents who comprise the largest ethnic/racial group of pregnant adolescents in the U.S. This study also examined whether dysfunctional beliefs account for associations between CSA and perceived stress and negative mood during pregnancy. One in four pregnant adolescents reported a history of CSA, which is lower than the 45% of pregnant adolescents who report CSA according to a recent meta-analysis[8]. Growth curve models revealed that perceived stress and negative mood both declined over the course of pregnancy, however, changes were minimal. A history of CSA was not associated with EMA-assessed negative mood, but it was related to increased perceived stress during the first trimester and dysfunctional attitudes mediated this association. Although CSA did not directly relate to negative mood during pregnancy, a history of CSA was indirectly associated with higher initial negative mood and a decrease in negative mood over the course of pregnancy that operated through dysfunctional attitudes. Consistent with hypotheses and traumagenic dynamics theory, which was developed to explicate the impact of sexual abuse[9], secondary analyses indicated that findings are specific to sexual abuse and not exposure to child abuse more generally.

Consistent with prior work[15], we found heightened perceived stress during pregnancy among women with CSA histories. This effect was specific to the first trimester, which also is consistent with other studies[18]. Studies with adults typically have found perceived stress

to increase during the first and third trimesters (e.g.,[19]), however, pregnant adolescents in the current study demonstrated slight linear decreases in perceived stress, which is congruent with at least one study finding a linear decline in psychological distress over the course of pregnancy[34].

We also found a novel association between dysfunctional attitudes and higher levels of perceived stress and negative mood during the first trimester. Although changes in perceived stress and negative mood were quite small over pregnancy, adolescents evidenced a decline in both outcomes and greater dysfunctional attitudes were associated with a swifter decline in negative mood over pregnancy. Different findings for perceived stress and negative mood may stem from methodological differences in how perceived stress was measured in the laboratory as a retrospective recall of previous month events, while negative mood was assessed in the moment several times during a 24-hour period. As further support for construct differences, low-level positive correlations emerged for trimesters 1 and 2, but the constructs were not significantly correlated by trimester 3. Although results on dysfunctional attitudes and negative mood could reflect regression to the mean, they also could reflect habituation to the negative cognitions and emotions that pregnancy may have initially triggered given that pregnancy is a result of sexual activity. Furthermore, because adolescents with more dysfunctional beliefs demonstrated swifter decreases in negative mood over the course of the study relative to those with fewer dysfunctional beliefs, adolescents with CSA histories who initially had more dysfunctional beliefs may have experienced psychological integration, and possibly aspects of resolution, through an emerging change in identity (i.e., motherhood)[35]. Specifically, attachment schemas may become salient during pregnancy[36] and the opportunity to form a new attachment bond as a caregiver may have a positive effect on levels of perceived stress and negative mood over the course of pregnancy. Families in which CSA occurs are often characterized as dysfunctional[37]. Participants for the current study were involved in a study involving regular contact with health care professionals who were monitoring their health and well-being; as a result, they may have had access to better services and care than they otherwise might have received. For adolescents with CSA histories, it is possible that this increased support made a substantial difference in their mood states during this potentially high-stress period.

Results should be interpreted in the context of limitations. First, the sample was small and due to other study aims, only high-functioning pregnant adolescents (e.g., those without substance use) were eligible for participation. There is ample evidence that pregnant adolescents with sexual abuse histories are more likely to use substances during pregnancy (e.g.,[18,38]); thus, excluding these individuals may have restricted our ability to examine the most severely abused adolescents. Second, adolescents were not specifically asked whether the index pregnancy was the result of CSA; such experiences could be associated with greater negative affect or stress during pregnancy. Third, individuals with higher negative mood ratings were less likely to complete all of the study assessments, and sensitivity analyses among those with complete data indicated no associations between dysfunctional attitudes and negative mood ratings. Had girls with higher negative mood completed all assessments, associations may have differed.

The current study highlights a number of directions for further research. While this study focused on experiences during pregnancy, future studies should examine how CSA, dysfunctional attitudes and beliefs, perceived stress, and negative mood are associated with birth outcomes and early child development. Examining maternal mental health diagnoses (e.g., depression, PTSD) during pregnancy may illuminate whether particular symptoms have differential relationships with perceived stress and negative mood. Efforts should be made to improve study retention among girls with increased levels of negative mood.

This study has important clinical implications. Rates of adolescent pregnancy are higher among Latinas, thus, it is critical to understand methods to improve their health and experiences (i.e., level of stress, mood) during pregnancy. Adolescents with CSA histories had increased dysfunctional attitudes and perceived stress during the first trimester when exposure to toxins and stressors could have a particularly detrimental effect on fetal development[39,40]. Identifying adolescents with CSA histories and dysfunctional attitudes early in pregnancy and providing increased support as well as cognitive therapy to reduce dysfunctional attitudes could result in potentially beneficial reduction in perceived stress and negative mood in this group.

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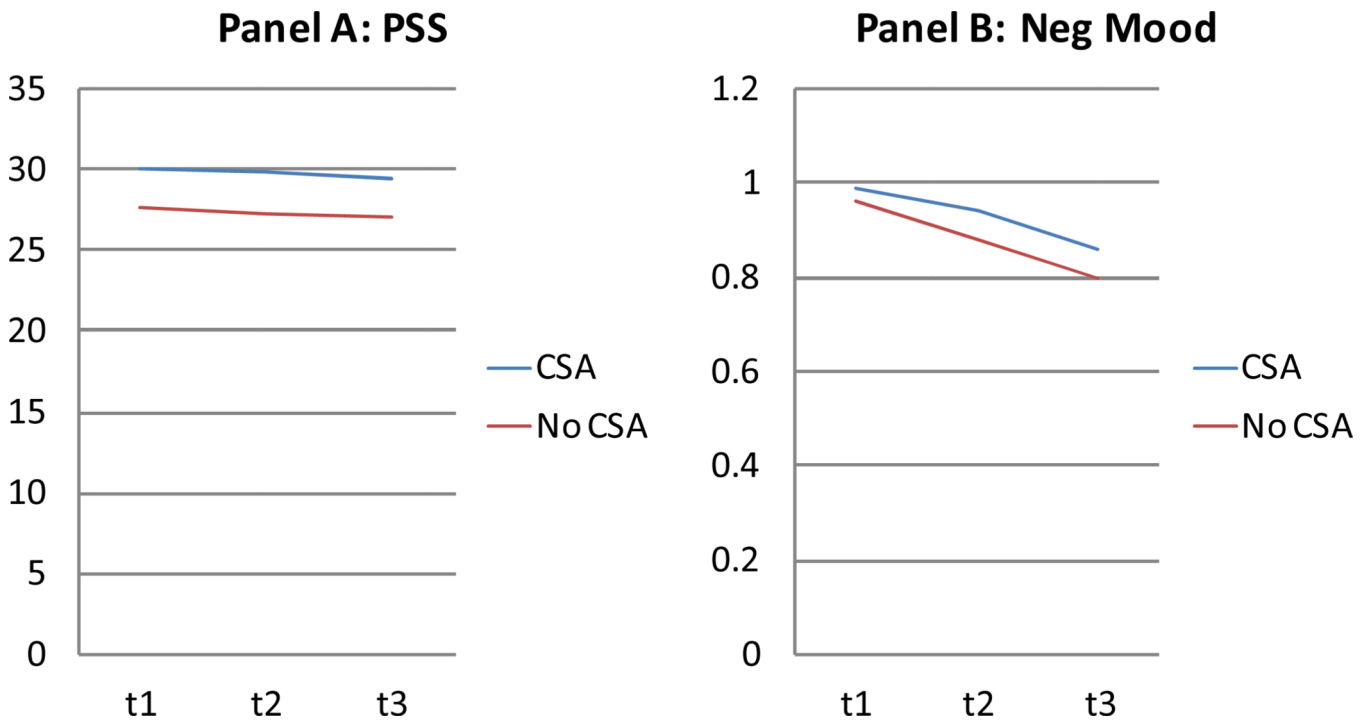

Figure 1. Changes in Perceived Stress and Negative Mood During Pregnancy by CSA History

Note: PSS = Cohen's Perceived Stress scale; Neg Mood = EMA Negative Mood; t1–t3 = trimester 1 through trimester 3

Table 1

Correlations between Perceived Stress, Dysfunctional Attitudes, and Negative Mood

	1	2	3	4	5	6	7
1.T1 PSS	--	.56**	.61***	.40*	.28**	.23*	.01
2. T2 PSS		--	.67**	.36	.28*	.29**	.32**
3. T3 PSS			--	.32	.12	.22	.15
4. DAS Total				--	.33*	−.02	.33
5. Neg 1					--	.12	−.02
6. Neg 2						--	.16
7. Neg 3							--

Table 2

Raw Mean Differences Between CSA Victims and Non-victims on Perceived Stress, Dysfunctional Attitudes, and Negative Mood

	CSA Victim (n = 50)	Non-CSA Victim (n = 134)	F (p)
T1 PSS (n = 118)	29.6 (6.6)	26.2 (6.4)	6.4 (.01)
T2 PSS (n = 117)	28.4 (6.5)	25.8 (7.0)	3.4 (.07)
T3 PSS (n = 107)	27.6 (4.9)	25.6 (5.6)	2.6 (.11)
DAS Total (n = 156)	122.8 (32.1)	106.2 (26.0)	11.4 (.001)
Neg Mood 1 (n = 122)	.88 (.60)	.83 (.47)	.25 (.62)
Neg Mood 2 (n = 117)	.76 (.52)	.70 (.46)	.33 (.56)
Neg Mood 3 (n = 107)	.57 (.29)	.53 (.28)	.43 (.51)

Note: CSA = Child Sexual Abuse; PSS = Cohen's Perceived Stress Scale total score; Neg = EMA Negative Mood; DAS = Dysfunctional Attitudes Scale

Table 3

Conditional and unconditional model results

	PSS int (variance)	PSS slope (variance)	Neg int (variance)	Neg slope (variance)
Unconditional Model:	27.6*** (29.4***)	−0.26** (.30)	0.96*** (0.33***)	−0.08*** (0.01*)
Conditional Models:	PSS int (SE)	PSS slope (SE)	Neg int (SE)	Neg slope (SE)
Model 1: CSA	2.38 (1.1)**	−0.23 (0.20)	0.03 (0.09)	0.06 (0.10)
Model 2: CSA	1.44 (1.0)	−0.24 (0.21)	−0.03 (0.11)	0.02 (0.02)
Model 2: DAS total	0.09 (.02)***	−0.001 (0.004)	0.007 (0.002)***	−0.001 (0.001)**

Note: PSS = Cohen's Perceived Stress Scale total score; Neg = EMA Negative Mood; CSA = Child Sexual Abuse; DAS = Dysfunctional Attitudes Scale; Unstandardized parameters are presented above;

** $p < .01$,

*** $p < .001$.