Adverse childhood experiences combined with emotional and physical abuse by the partner predict antenatal depression.

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Highlights

- Adverse childhood experiences, intimate partner violence and social support significantly predict antenatal depressive symptoms.

- The effect of childhood neglect on antenatal depressive symptoms is partly mediated by lowered social support from friends.

- Experience of abuse by a partner including emotional abuse may be an important risk factor of antenatal depression as well as recent violent acts.

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Abstract

Background: Few studies examined the contributions of childhood adversities, intimate partner violence and social support to antenatal depression (AD). This study aims to 1) evaluate association of these psychosocial factors with AD symptoms in early pregnancy; and 2) examine the mediating effect of social support on the relationship between psychosocial stressors and AD symptoms.

Methods: Participants were 120 pregnant women aged from 18 to 49 in less than 16 gestational weeks and attending at Antenatal Care Center at Khon Kaen hospital, Thailand. AD symptoms were assessed by the Edinburgh Postnatal Depression Scale (EPDS). Childhood adversities, intimate partner violence and social support were measured using the Adverse Childhood Experiences Questionnaire (ACE questionnaire), Abuse Assessment Screen (AAS), and Multidimensional Scale of Perceived Social Support (MSPSS).

Results: We found that the EPDS score was significantly and positively associated with adverse childhood experiences (ACEs) and negatively with social support. Partial Least Square analysis showed that 49.1% of the variance in the depressive subdomain of the EPDS score was predicted by ACEs, namely psychological and physical abuse and neglect, emotional or physical abuse by the partner, unplanned pregnancy, and no satisfaction with their relationship. The effects of adverse childhood experience due to

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neglect on the EDPS score was mediated by social support by friends.

Limitations: ACEs were assessed retrospectively and, therefore, may be susceptible to

recall bias.

Conclusion: Prenatal depression scores are to a large extent predicted by psychological

distress as indicated by early lifetime trauma, abuse by partner, relation satisfaction, and

implications of unintended pregnancy.

Key words: Antenatal depression, Adverse childhood experiences, intimate partner

violence, social support

1. Introduction

Antenatal depression (AD) which is defined as "a non-psychotic depressive episode of mild to major severity that occurs during pregnancy (Gelaye et al., 2016)" is one of the commonest morbidities during the perinatal period (Howard et al., 2014). It is estimated that 18.4% of pregnant women are affected by AD during their pregnancy, and point prevalences are 7.4-11.0% in the 1st trimester, 8.5-12.8% in the 2nd trimester, and 8.5-12.0% in the 3rd trimester (Bennett et al., 2004; Gavin et al., 2005). Generally, a higher prevalence of AD is reported in low- and middle-income countries (19.2%) than in high-income countries (9.2%) (Woody et al., 2017). Depression during pregnancy increases the risk not only of negative pregnancy outcomes such as preterm birth, low birth weight, operational delivery, and preeclampsia, but also of poor physical and neurocognitive developmental outcomes in infants (Gentile, 2017; Grigoriadis et al., 2013; Grote et al., 2010; Hu et al., 2015; Jarde et al., 2016).

Several factors are associated with AD, such as age, household income, employment status, education level, marital status, ethnicity, chronic medical conditions, parity (primigravida or multiparous), a history of previous delivery problems (miscarriage, stillbirth, abortion, cesarean delivery) (Ayele et al., 2016; Brittain et al., 2015; Fisher et al., 2013; Melo et al., 2012; Melville et al., 2010; Stewart et al., 2014). However, a

systematic review, which analyzed the risk factors of depressive symptoms during pregnancy, revealed that psychosocial factors, such as life stress, lack of social support, and domestic violence were consistently associated with AD symptoms, while no association were found with socioeconomic status measures (Lancaster et al., 2010).

It is well known that early childhood adversity may increase sensitivity to stress across the life span, with increases in vulnerability for emotional distress during adulthood (McLaughlin et al., 2010). Tung et al. (2019) showed that prenatal intimate partner violence moderated the association between childhood adversity and emotional distress. Therefore, it may be hypothesized that women with childhood adversity are at increased risk of AD when there are current stressors including intimate partner violence.

Adequate social support is one of the protective factors which increases resilience to AD, and perceived social support may mediate the relationship between childhood neglect and antenatal psychological distress (Zhang et al., 2020). Racine et al. (2018a) reported that high levels of social support in pregnancy may attenuate the detrimental effects of ACEs on antepartum health risk, although this moderating effect was not significant when considering the association between ACEs and AD (Racine et al., 2020). Therefore, the net effects of social support on AD are still largely unknown. In particular, no studies have examined whether social support may protect against the effects of

intimate partner violence on depressive symptoms in pregnant women who suffered childhood adversity.

Moreover, in lower middle income countries, childhood abuse and intimate partner violence are highly prevalent as compared to higher income countries and, therefore, these factors could have a greater impact on pregnant women in lower middle income countries (Gelaye et al., 2016). A systematic review by Fisher et al. (2012) showed that psychosocial factors significantly contribute to pregnant women's mental health in lower middle-income countries (Fisher et al., 2012). However, there are few studies which examined the contributions of these psychosocial factors to the onset of AD. Understanding the unique contributions of these exposures to AD has important implications to develop more effective preventive and treatment strategies.

Hence, the aims of the study are to 1) evaluate the association of early childhood adversities, intimate partner violence, and social support with AD symptoms in early pregnancy; and 2) examine the mediating effect of social support on the relationship between psychosocial stressors and AD symptoms. The specific hypotheses are that: 1) early childhood adversities and intimate partner violence, and lower level of social support predict both increased AD symptoms and clinical risk of AD during early pregnancy; and 2) lowered social support may partly mediate this relationship.

2. Methods

Participants

The study was conducted at the Antenatal Care (ANC) Center, Khon Kaen Hospital, Khon Kaen, Thailand. Khon Kaen is one of the provinces in the Northeast region of Thailand and the hospital is classified as a regional hospital. The study population consisted of pregnant women attending the ANC. All pregnant women were checked for eligibility by a well-trained researcher using pre-defined inclusion and exclusion criteria. Inclusion criteria were pregnant women 1) aged from 18 to 49, 2) whose pregnancy had not exceeded 16 gestational weeks, 3) living in Northeast region of Thailand, 4) intending to continue ANC care in the hospital until delivery, 5) who are able to read and write Thai, 6) who are willing to participate in the study, and 7) who can be reached by a cell phone. Exclusion criteria were pregnant women who had been diagnosed with any mental illnesses other than depression and were taken antidepressants. Ethical approval was obtained from the Institutional Review Board (IRB) in both the Khon Kaen Hospital and Chulalongkorn university (KEF62036 and COA No.280/2019). Written informed consent was obtained from all women.

Measurements

AD symptoms were assessed using the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987). EPDS is the most widely used and validated tool to assess depression throughout pregnancy (Bunevicius et al., 2009). It consists of 10 items on a four-point Likert scale (a score from 0 to 3; total score ranges from 0 to 30) and represents a measure of the mother's mood for the preceding seven days. In the Thai version of the EPDS, the validated cutoff value for screening among pregnant women was ≥10 (AUC 0.84, sensitivity 60% and specificity 90%) (Pitanupong et al., 2007). This scale shows good reliability and validity as defined in a study conducted in the upper Northeast region of Thailand among pregnant women in the 3rd trimester (Item-Objective-congruence: IOC was 0.90 and Cronbach's Alpha was 0.83) (Phoosuwan et al., 2017). The sociodemographic information comprised data including age, marital status, household income, and partner age. Gravidity, parity, pre-pregnancy weight and height were checked by a medical record. Pregnancy planning and history of AD and/or PPD were scored as planned/unplanned and Yes/No.

Relationship satisfaction was measured using a 4-point Likert scale from "satisfied" to "dissatisfied". Perceived social support measured by the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al., 1988), and intimate partner

violence was measured employing the Abuse Assessment Screen (AAS) (McFarlane, 1992). The MSPSS consists of 12 items rated on a seven-point Likert scale (score from 1 to 7 per item) (Zimet et al., 1988). Subdomains are family support, friends support, and significant other support. A revised Thai version was developed and validated by Wongpakaran et al. (2018). The validity was ensured among Thai elderly with mental illnesses and Cronbach's alpha was 0.89 in the group overall (Wongpakaran et al., 2018). Moreover, this questionnaire was used to assess pregnant women's social support in the northeast region of Thailand (Phoosuwan et al., 2018). Permission of use the questionnaire was obtained from the author (Dr. Nahathai Wongpakaran). AAS is one of the most widely used intimate partner violence screening tools in the pregnant population and consists of 5 items scored as yes or no (Neha, 2013). "Yes" item to any question denotes abuse. Thai version of the scale was used in a previous study to determine pregnant women's physical, emotional, and sexual violence (Thananowan and Kaesornsamut, 2010).

Adverse childhood experiences were assessed by the Adverse Childhood Experiences (ACE) Questionnaire (Felitti et al., 1998). The ACE questionnaire was established by the ACE study in Centers for Disease Control and Prevention to identify childhood experiences of abuse and neglect (Felitti et al., 1998). It consists of 28 questions

and is categorized into 10 categories: psychological abuse, physical abuse, sexual abuse, mental neglect, physical neglect, domestic violence, substance abuse in the family, family psychiatric illness, separation or divorce in the family, family members in criminals. The Thai version of the questionnaire was validated by Rungmueanporn (2019), and showed an internal consistency reliability of 0.79 for the abuse domain, 0.82 for the neglect domain, and 0.66 for the household dysfunction domain (Rungmueanporn, 2019). In the present study we used the raw ACE scores on the 10 items in our analyses. Permission of use was obtained from the author (Dr. Parichawan Chandarasiri).

Data analysis

We used analysis of variance (ANOVA) to assess differences in scale variables among the study groups and Chi-squares (χ^2) or Fisher's exact probability test to assess differences among categories. Correlations between scale variables were assessed with Pearson's product-moment correlation coefficients. Stepwise (automatic) multiple regression analysis was used to assess the most important biomarkers predicting the EPDS score. All results were checked for multicollinearity. Automatic stepwise binary logistic regression analysis was conducted to delineate the best prediction of antenatal depression versus no antenatal depression. Generalized Linear Model (GLM) analysis

was employed to examine the association between the MSPSS domains and ACEs.

Statistical tests were two-tailed and a p-value of 0.05 was used for statistical significance.

Principal component analysis followed by oblimin-rotation was performed to examine

the different subdomains in the EPDS, ACE and MSPSS items. The KMO statistic and

Bartlett's test were used to examine the factoriability of the data. The number of principal

components was based on the number of eigenvalues > 1 and explained variance > 50.0%.

All statistical analyses were performed using IBM SPSS windows version 25, 2017.

We also conducted Partial Least Squares (PLS) analysis to examine a) the causal

relationships between ACEs, AAS, unplanned pregnancy, relation satisfaction, and EPDS

dimensions; and b) whether the effects of ACEs are mediated via MSPSS scores. All those

variables were entered as single indicators, except ACE-Abuse which was a formative

vector constructed using physical and psychological abuse. Complete PLS analysis was

conducted when the model quality data complied with prespecified criterion, namely

SRMR <0.080. Consequently, we performed PLS analysis using 5.000 bootstrap samples

and computed pathway coefficients with exact p-value, weights of the indicators in the

outer model, and specific indirect effects.

3. Results

3.1. Socio-demographic data

Table 1 shows the sociodemographic data of the pregnant women divided into those with and without AD. There were no significant differences in age, gravidity, parity, marital status, BMI, household income, partner age, and a history of AD between both study groups.

3.2. Results of factor analysis

Table 2 shows the results of factor analyses performed on the EPDS and ACE scores. The results show that two factors could be extracted from the 10 EPDS item scores which together explained 50.51% of the variance. The KMO values indicating sampling adequacy and the significance of Bartlett's test showed that the factorability of the correlation matrix was very good. Oblimin rotation showed that the first PC loaded highly (> 0.5) on depressive symptoms, including items 1, 2, 3, 7, 8, 9 and 10, and that the second factor loaded highly on anxiety symptoms, namely items 4, 5, 6, and 8. Therefore, the first PC is named EPDS-depression PC and the second the EPDS-anxiety PC.

Table 2 shows that two factors could be extracted from the 8 ACE item scores which explained 57.51% of the variance. The KMO statistic and the Bartlett's test results showed that the sampling adequacy and the factorability of the correlation matrix were adequate and, thus, that factor analysis could be performed. Family separation and

criminal behavior in a family member were not entered as there was virtually no variance in these data. Oblimin rotation showed that the first PC loaded highly on psychological and physical abuse, domestic violence, a history of substance abuse in the family, and a history of psychiatric illness in the family and, therefore, this factor is named the ACE Family-Dysfunction & Abuse (ACE-FDA) PC. The second factor loaded highly on two items namely mental and physical neglect and is named the ACE-neglect. Sexual abuse contributed more to ACE-FDA (loading 0.4) than to PC2 (loading -0.29). The KMO statistic (0.834) and the Bartlett's test results ($\chi2=1015.83$, df=66, p<0.001) showed that the sampling adequacy and the factorability of the MSPDD correlation matrix were very good. The first factor explained 48.68% of the variance and loaded highly (all > 0.591) on all items.

3.3. Clinical differences between women with and without AD

Table 3 shows the clinical differences between women with and without AD. The EDPS total, EPDS-depression and EDPS-anxiety scores were significantly higher in AD women than in those without AD. The ACE-FDA and ACE-neglect scores were significantly higher in women with AD as compared with those without AD. Significantly more women with AD showed a higher frequency of item 1 (Have you ever been

emotionally or physically abused by your partner or someone important to you?) of the

AAS as compared with women without AD. The MSPSS total score was significantly

lower in women with AD than in those without AD. The MSPSS friends subscale was

significantly lower in women with AD, whereas there were no significant differences in

the MSPSS significant other and family subscales. The frequencies of unplanned (versus

planned) pregnancy and no relation satisfaction (versus satisfaction) were significantly

higher in women with AD than in those without.

3.4. Best prediction of the EPDS scores.

   Table 4 shows the outcome of 3 multiple regression analysis with the EPDS score

and the two domain subscores as dependent variables and AAS (item 1), relation

satisfaction, unplanned pregnancy, the MSPSS friends subscore, ACE scores (the 2 first

PCs and the separate items) as explanatory variables. The first regression in table 4 shows

that 49.5% of the variance in EPDS-depression was explained by AAS item 1, unplanned

pregnancy, no relation satisfaction, psychological abuse (all positively associated), and

MSPSS friends (inversely associated). Regression 2 showed that 14.4% of the variance

in EPDS-anxiety was explained by unplanned pregnancy and psychological abuse. We

found that 42.4% of the variance in the total EPDS score was explained by unplanned

pregnancy, AAS item 1, psychological abuse, and no relation satisfaction (all positively

associated).

Table 5 shows the results of logistic regression analysis with AD as dependent

variable and no AD as reference group. We found that AD was best predicted by

psychological abuse, AAS item 1, and unplanned pregnancy ($\chi2$=33.66, df=3, p<0.001,

Nagelkerke pseudo-R^2=0.351).

3.5. Associations between MSPSS and ACE.

Since there is the possibility that ACEs may affect social support, we have

examined the effects of the ACE on MSPSS scores. **Table 6** shows the results of

multivariate and univariate GLM analysis with MSPSS and the three domain subscores

as dependent variable and ACE-FDA and ACE-neglect as explanatory variables. We

found that ACE-neglect, but not ACE-FDA, was significantly associated with the MSPSS

values with an effect size of 0.429. Univariate GLM shows that ACE-neglect was

significantly associated with (in descending order of importance) MSPSS family, MSPSS

total, MSPSS other, and MSPSS friends.

3.6. Results of PLS analysis.

Since ACE-neglect significant impacts MPSSP and the latter was associated with EPDS-depression we have performed PLS pathway analysis to examine the effects of ACE-neglect and ACE-abuse, no relation satisfaction, AAS item 1, and unplanned pregnancy on the two EPDS subscores. The latter were entered as output variables and all other variables as input variables, while ACE-neglect and ACE-FDA predicted MSPSS-friends. All variables were entered as single indicators except ACE-abuse which was a formative latent vector based on both physical and psychological abuse (named ACE_abuse). The model fit was more than adequate with SEMR=0.021. We found that 49.1% of the variance in EPDS-depression was explained by MSPSS-friends (inversely), ACE_abuse, no relation satisfaction, AAs item 1, and unplanned pregnancy. We found that 12.7% of the variance in EPDS-anxiety was explained by the regression on AAS item 1 and unplanned pregnancy. ACE-neglect significantly predicted MSPSS. There was a significant indirect effect of ACE-neglect on EPDS-depression, which was mediated by MSPSS (t=1.99, p0.047). As such, both ACE-abuse and ACE-neglect predicted EPDS-depression.

4. Discussion

Early childhood adversities

The major finding of this study is that early childhood adversities, intimate

partner violence and social support significantly predicted antenatal depressive symptoms, even after controlling for relevant potential confounders. Unsatisfactory relationship with a partner, such as history of abuse by the partner, unplanned pregnancy and no relation satisfaction with the partner were other predictors of antenatal depression and anxiety.

In our study almost 57% of participants experienced at least one of the ACEs. Particularly, childhood neglect was reported by 30% of participants. Although recently several studies have focused on the negative effects of ACEs on mental status during pregnancy, there are few studies which examined which the types of ACEs that predict depressive symptoms. Racine et al. (2018b) examined effect of childhood adversities on maternal health among 1,994 women by using three subscales, namely household dysfunction, physical/emotional abuse, and sexual abuse. The result showed that those who experienced physical/emotional abuse and household dysfunction were more likely to have psychosocial difficulties in their pregnancy. However, in this case, psychosocial difficulties were assessed by using 7 items of psychosocial factors: depression, anxiety, stress, social support, history of mental illness, marital status, and income, and, therefore, the relation between childhood adversities and AD was not clear. Atzl et al. (2019) categorized adversities into two subtypes, namely maltreatment and family dysfunction, and found that maltreatment predicted increased severity of depressive symptoms, while

family disfunction did not. However, since abuse and neglect were assessed into one subscale as maltreatment, it was impossible to differentiate between these two factors. A cohort study following 2,861 adults for 30 years showed that depression in adulthood was more related to physical abuse in childhood and anxiety was more associated with emotional abuse and neglect (Kisely et al., 2020). However, our findings showed that both abuse and neglect increased depressive symptoms.

Although the pathways which underpin the effects of childhood adversaries on mental health problems in adulthood are not fully explained, activated immune-inflammatory and oxidative stress pathways contribute to vulnerability to stressors in adulthood (McLaughlin et al., 2010). ACE determine at least in part chronic inflammation in adulthood (Lacey et al., 2020). For example, childhood physical abuse (but not sexual abuse and neglect), as identified with official reports, significantly predicted increased CRP levels in adulthood, with females with ACEs showing significantly higher CRP levels as compared to males (Osborn and Widom, 2020). Moraes et al. (2018) reported that more that 50.0% of the variance in the increased CRP levels in women with bipolar disorder was predicted by sexual abuse, body mass index and age. McCormack et al. (2021) showed a significant positive association between childhood maltreatment and IL-6 in pregnancy in the context of poorer diet quality with adjusting for BMI. Increased

physical abuse was also a strongly associated with indices of nitro-oxidative stress and lowered antioxidant defenses in patients with affective disorders (Maes et al., 2021). Neuro-immune and neuro-oxidative stress pathways are associated with prenatal depression (Roomruangwong et al., 2018) and, therefore, the effects of ACE may be mediated by those pathways (Maes et al., 2021).

Role of social support

The second major finding of this study is that the effect of childhood neglect on antenatal depressive symptoms was partly mediated by lowered social support from friends. On the other hand, antenatal anxiety symptoms were not predicted by any ACEs or social support. The mediating effects of social support on the relationship between ACEs and AD are still controversial. A structural equation modeling (SEM) conducted by Lydsdottir et al. (2019) showed a mediating effect of history of depression and adulthood adverse experiences on the relationship between ACEs and antenatal common mental disorders, however, social support did not show such an effect. On the other hand, Zhang et al. (2020) identified a significant mediating effect of social support on the relationship between childhood neglect and psychological distress. These studies, however, did not reveal which types of ACEs is affected by which types of social support.

Intimate partner violence

Among our participants 17.5% had had any types of intimate partner violence, which agrees with the findings of a previous report showing a 15% prevalence rate of intimate partner violence in Thailand (Chuemchit et al., 2018). A recent meta-analysis showed that pregnant women with probable depression reported increased odds of having experienced intimate partner violence during their lifetime, the past year, and during pregnancy (Howard et al., 2013). Moreover, a population-based cohort study conducted in South Africa showed that intimate partner violence intensity was significantly associated with depression symptom severity during pregnancy (Tsai et al., 2016). Our results did not show a significant association between intimate partner violence during the last year prior to pregnancy and AD symptoms. These negative findings might be a consequence of the small number of participants who experienced intimate partner violence. However, we found that having experienced emotional or physical abuse by a partner significantly increased the clinical risk of AD with an Odds ratio of 5.16. This means that not only recent abuse, but also experience of abuse including emotional abuse may be an important risk factor of AD.

Limitations

Several limitations of the current study must be acknowledged. First, our psychosocial data were obtained from self-report measures. Lack of assessment of clinical interview might overestimate the severity of depressive symptoms. However, the Thai version of EPDS which has been validated against the clinical interview with high sensitivity and specificity. ACEs was also retrospectively completed by the participants, and, therefore, might be susceptible to recall bias. ACEs identified prospectively may have different risk pathways to mental illness than ACEs identified retrospectively (Baldwin et al., 2019). Second, our data were collected at the regional hospital which is locally representative of the Northeast region of Thailand and therefore the results may not be generalizable.

Conclusions

Our findings show the importance of screening of childhood adversities, intimate partner violence and social support at early pregnancy to effectively prevent AD. Specifically, not only childhood abuse and neglect but also social support should be assessed. Additionally, assessment of intimate partner violence should include not only recent violent acts but also physical and emotional abuse.

Conflict of interests

The authors declare that they have no conflict of interests.

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Table1. Sociodemographic and obstetric characteristics of 120 pregnant women, 34 with antenatal depression (AD) and 86 without AD (No AD).

	AD n=34		No AD n=86		F/χ2/FEPT	df	p-value
Age (years)	27.4	(6.0)	27.1	(5.3)	0.09	1/118	0.772
Gravidity							
1	13	(38.2)	31	(36.0)	3.02	2	0.221
2	10	(29.4)	38	(44.2)			
>=3	11	(32.4)	17	(19.8)			
Parity							
0	15	(44.1)	34	(39.5)	1.79	2	0.408
1	14	(41.2)	45	(52.3)			
>=2	5	(14.7)	7	(8.1)			
Marital status							
Married or domestic partnership	33	(97.1)	83	(96.5)	–	–	1.00
Other	1	(2.9)	3	(3.5)			
Pre-pregnancy BMI (kg/m2)	23.2	(5.3)	23.4	(5.8)	0.47	1/118	0.898
Household income (baht/month)	19853	(8832)	20467	(14066)	0.06	1/118	0.813
Partner age	31.4	(8.6)	29.7	(5.9)	1.44	1/118	0.232
AD/PPD history							
No	33	(97.1)	83	(96.5)	–	–	1.00
Yes	1	(2.9)	3	(3.5)			

All results are shown as mean (SD) or as frequencies. F/χ2/FEPT: all results of analysis of variance (ANOVA), analysis of contingency tables (χ2

Test) or Fisher's Exact Probability test (FEPT).

Table2. Results of principal component analysis performed on the Edinburgh Postnatal Depression Scale (EPDS) and Adverse Childhood Experiences (ACE) rating scale

EPDS				ACE		
Variables	PC1	PC2		Variables	PC1	PC2
EPDS1	**0.500**	-0.465		Psychological abuse	**0.650**	0.317
EPDS2	**0.672**	-0.009		Physical abuse	**0.816**	0.180
EPDS3	**0.535**	-0.333		Sexual abuse	**0.396**	-0.291
EPDS4	0.299	**-0.818**		Mental neglect	0.182	**0.875**
EPDS5	0.331	**-0.794**		Physical neglect	0.324	**0.860**
EPDS6	0.479	**-0.655**		Domestic violence	**0.767**	0.163
EPDS7	**0.629**	-0.371		Substance abuse in the family	**0.714**	0.251
EPDS8	**0.813**	-0.543		Family psychiatric illness	**0.696**	-0.007
EPDS9	**0.727**	-0.342				
EPDS10	**0.658**	-0.269				

Component	EPDS Depression	EPDS Anxiety		Component	Family	Neglect
KMO	0.823			KMO	0.727	
Bartlett's test				Bartlett's test		
$\chi2$	333.86			$\chi2$	288.13	
df	45			df	28	
p-value	<0.001			p-value	<0.001	
Explained variance	50.51			Explained variance	57.51	

Table3. Differences of psychosocial characteristics between women with antenatal depression (AD) and without AD (No AD).

		AD n=34		No AD n=86		F/χ2/FFPT	df	p-value
EPDS total		12.3	(2.8)	3.5	(2.6)	274.13	1/118	<0.001
EPDS Depression		7.4	(2.6)	1.7	(1.7)	199.18	1/118	<0.001
EPDS Anxiety		5.0	(1.5)	1.8	(1.7)	91.34	1/118	<0.001
ACE FDA (z scores)		0.562	(1.535)	-0.222	(0.555)	17.04	1/118	<0.001
ACE Neglect (z scores)		0.344	(1.112)	-0.136	(0.924)	5.83	1/118	0.017
AAS: experience of emotional or physical abuse								
	No	23	(67.6)	79	(91.9)	11.21	1	0.001
	Yes	11	(32.4)	7	(8.1)			
MSPSS total		5.33	(0.89)	5.80	(0.81)	7.14	1/118	0.009
MSPSS significant other		5.42	(1.01)	5.63	(1.18)	0.83	1/118	0.365
MSPSS family		5.90	(0.98)	6.22	(0.82)	3.35	1/118	0.070
MSPSS friends		4.74	(1.28)	5.57	(1.04)	13.48	1/118	<0.001
Planned pregnancy								
	Yes	11	(32.4)	65	(75.6)	19.61	1	<0.001
	No	23	(67.6)	21	(24.4)			
Relation satisfaction with a partner and family								
	Satisfied	27	(79.4)	83	(96.5)	–	–	0.005
	Other	7	(20.6)	3	(3.5)			

All results are shown as mean (SD) or as frequencies. F/χ2/FEPT: all results of analysis of variance (ANOVA), analysis of contingency tables (χ2

Test) or Fisher's Exact Probability test (FEPT).

EPDS: Edinburgh Postnatal Depression Scale

ACE: Adverse Childhood Experiences

FDA: Family Dysfunction Abuse

AAS: Abuse Assessment Screen

MSPSS: Multidimensional Scale of Perceived Social Support

Table4. Results of multiple regression analysis with Edinburgh Postnatal Depression Scale (EPDS) rating scale score as dependent variable.

Dependent variables	Explanatory variables	β	t	p-value	Model F	df	p-value	R²
EPDS depression					22.58	5/114	<0.001	0.495
	AAS: experience of emotional or physical	0.328	4.71	<0.001				
	Unplanned pregnancy	0.237	3.32	0.001				
	Relation dissatisfaction	0.262	3.67	<0.001				
	Psychological abuse	0.188	2.77	0.009				
	MSPSS friends	-0.160	-2.24	0.027				
EPDS anxiety					9.83	2/117	<0.001	0.144
	Unplanned pregnancy	0.279	3.22	0.002				
	Physical abuse	0.221	2.55	0.012				
EPDS total					21.19	4/115	<0.001	0.424
	Unplanned pregnancy	0.280	3.75	<0.001				
	AAS: experience of emotional or physical	0.273	3.69	<0.001				
	Psychological abuse	0.252	3.40	0.001				
	Relation dissatisfaction	0.293	3.21	0.002				

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Table5. Prediction of antenatal depression (AD) using binary logistic regression analysis

Explanatory variables	β	SE	Wald	df	p-value	OR	95%CI
Psychological abuse	0.467	0.262	5.37	1.00	0.020	1.60	1.08-2.37
AAS: experience of emotional or physical abuse	1.640	0.631	6.75	1.00	0.001	5.16	1.50-15.77
Unplanned pregnancy	1.975	0.493	15.54	1.00	<0.001	7.00	2.66-18.40

OR: Odds Ratio

95%CI: 95% Confidence Interval

Table 6. Association between the Multidimensional Scale of Perceived Social Support (MSPSS) and adverse childhood experiences (ACE) rating scale

Type	Dependent variables	Explanatory variable	F	df	p-value	R^2
Multivariate	MSPSS significant other					
	MSPSS family	FDA	0.45	1/117	0.718	0.012
	MSPSS friends	Neglect	28.85	1/117	<0.001	0.429
	MSPSS total					
Univariate	MSPSS significant other	Neglect	31.33	1/117	<0.001	0.211
	MSPSS family	Neglect	73.56	1/117	<0.001	0.386
	MSPSS friends	Neglect	17.38	1/117	<0.001	0.129
	MSPSS total	Neglect	60.78	1/117	<0.001	0.342

Figure 1. Result of PLS pathway analysis showing the relations between psychosocial factors and EPDS score