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Original Research

Impact of the Mother's Mental Health and Socioeconomic Status on Prenatal Attachment in a Population-Based Sample of Expectant Romanian Women

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Abstract

Background: The health development of a baby during pregnancy is greatly influenced by prenatal bonding. The purpose of this study is to assess maternal-fetal attachment in the second- and third-trimesters and explore how the mother's mental health and socioeconomic circumstances may affect it. Additionally, this study takes into account other relevant aspects, and addresses the existing lack of relevant information in Romania. **Methods**: We conducted a cross-sectional study. Data were collected from 200 pregnant women in the second- and third-trimesters of pregnancy. Personal Information Form (PIF), Depression, Anxiety, and Stress Scale-21 (DASS-21), and Maternal-Foetal Attachment Scale (MFAS) questionnaires were collected. **Results**: There was no statistically significant correlation between the MFAS and the mental health of the mother. Moreover, subsequent comparative analyses revealed a significant difference only in the case of socio-economic conditions, with women with a moderate socio-economic status showed higher levels of maternal-foetal attachment. **Conclusions**: The degree of maternal-foetal attachment is not significantly influenced by social characteristics such as age, education level, socio-economic context, or place of residence. The MFAS measured the attachment relationship. However, the study found no statistically significant correlation between the mother's mental health and this attachment.

Keywords: prenatal; materno-foetal attachment; depression; anxiety; stress; mental health; pregnancy; socio-economic

1. Introduction

Bowlby, who delivered a report on behalf of the World Health Organization, is credited with depeloping the concept of the human attachment connection. According to Bowlby, it is recommended that , infants and young children experience a warm, intimate, and continuous relationship with their mothers, a connection that allows both to find satisfaction and enjoyment [1]. For mothers and their children, a lack of attachment ties may have permanent health effects [2]. Critical elements related to the attachment relationship are continuously being researched despite the theory's long history.

Attachment between the mother and the baby begins before birth, when the woman finds out she is pregnant. This type of attachment is scientifically called maternal-foetal attachment. In 1981, Cranley defined it as the extent to which women engage in behaviours that represent an affiliation and interaction with their unborn child [3]. This definition by Cranley is adopted in the present study as well.

Moreover, Cranley developed the first instrument for measuring maternal-foetal attachment, which is one of the most used in this topic—the Maternal-Foetal Attachment Scale (MFAS). Herein, MFAS inversion adapted and validated in the Romanian context has been employed. More information will be provided in the methodology section.

Pregnancy is a time of transition, mainly for women, which brings about changes in identity, relationships, emotions, and physical health [4]. The attachment relationship plays an essential role in the psychological definition of the individual. It is a court essential in the prenatal period because it dictates how the future child's personality will be developed [5]. The attachment bond is the mechanism through which nature ensures the survival of the species. The oxytocin hormone plays an extraordinary role in the attachment bond. Oxytocin and prostaglandins help stimulate contractions in pregnant women at birth. They also soften the cervix and help with placental separation and expulsion after birth. Oxytocin also causes milk to be released from the mammary glands, and its level increases when the mother touches her infant. In addition, it enhances neocortical development, cortical blood supply maintenance, and maternal behaviour [6].

The relationship between a mother and her unborn child intensifies as the woman may begin to feel the movement of the foetus inside the uterus starting from 16 weeks of pregnancy [7,8]. Additionally, during this time, the pregnant woman starts to imagine some aspects of the baby, such as their personality or physical characteristics [9,10]. This idea that the foetus is a human being strengthens the pregnant mother's attachment to the child.

The psychological bond that forms between the mother and the unborn baby is a set of thoughts, emotions, desires and expectations [11,12]. Only 10–15% of women do not develop a bond with their baby by the third-trimester [13]. Bonding impairment appears to remain stable across the antenatal and postnatal periods [10] and predicts lower responsive and sensitive parenting, insecure mother-infant attachment, and mental health problems in children [14,15]. Assuming the birth process and the attachment bond develop naturally without any impediments, the mother and her baby are wholly coordinated; their heart and breathing rhythms synchronize, and brain frequencies slow down to the Theta level. The process of birth can then be natural and gentle. Therefore, it is crucial to understand the low pregnancy acceptability of antenatal bonding.

Higher degrees of maternal-foetal attachment have been linked to several factors like receiving family support and improving psychological health [16], ultrasound visualization of the fetus using modern technologies [17], women with previous pregnancy loss [18], or fetuses with anomalies [19].

The goal of the current study is to determine the impact of a mother's mental health, socio-economic contexts, and characteristics on maternal and foetal well-being, considering the importance of developing an attachment bond as early as the prenatal period. Thus, we formulate the following hypotheses:

H1: There is a correlation between the level of maternal-foetal attachment and the level of depressive symptomatology.

H2: There is a correlation between the level of maternal-foetal attachment and the level of anxious symptomatology.

H3: There is a correlation between the level of maternal-foetal attachment and the level of stress.

H4: There are differences in the level of maternal-foetal attachment between women who have an urban residence and those who have a rural residence.

H5: Women with higher education (bachelor's, master's or doctoral studies) have a higher level of maternal-foetal attachment than those without higher levels of education.

H6: Younger women under 30 years of age have a higher level of maternal-foetal attachment than women over 30 years of age.

H7: There are significant differences in terms of maternal-foetal attachment depending on the level of socio-economic conditions.

2. Materials and Methods

2.1 Participants

Participants were pregnant women hospitalized in the Clinic of Obstetrics and Gynecology (COG), "Pius Brinzeu" County Clinical Emergency Hospital (PBCCEH), Timisoara, Romania. The unit is specialized in the care of pregnant patients from the first-trimester of pregnancy until birth. As a third-level hospital, it receives all pregnant patients from Western Romania diagnosed with a threat of premature birth or with a complicated pregnancy were directed to it. However, this unit also caters to physiological births in the region.

This study was conducted with women who were hospitalized at the COG of the PBCCEH from October 1st, 2021 to February 1st , 2022, who expressed a desire to participate in our study conducted through the questionnaire method.

The criteria for eligibility to participate in the study were: pregnant women who were (a) more than 18 years old, (b) at least in the 16th, week of pregnancy, (c) able to read and understand Romanian, and (d) willing to participate in research and sign consent forms. From the total number of patients who received care during the studied period, those who did not meet the eligibility criteria and those who did not want to complete or only partially complete the questionnaires were excluded. Finally, a total of 200 pregnant women were included in the study.

2.2 Procedure

This cross-sectional study included one evaluation, in which several instruments were administered from the Department of Neurosciences, the Center for Neuropsychology and Behavioral Medicine, the Center for Social Diagnosis, the Psychiatry Clinic, the COG from Timisoara. More precisely, between weeks 26 and 41 of pregnancy (first assessment), pregnant patients were administered a Personal Information Form (PIF) and two questionnaires, which they completed individually: MFAS and Depression, Anxiety, and Stress Scale-21 (DASS-21).

A resident doctor part of the medical team that conducted the study, explained to the eligible pregnant women after being hospitalized, what to look for and what each questionnaire evaluates. Upon signing the consent form, the particiants received the questionnaires to complete during their hospital stay. The patients who declined to participate in the study were not administered questionnaires. For the time given to these questionnaires, the patients were not rewarded. It was a free effort on their part. The questionnaires were completed in 20 minutes: PIF took up five minutes, and MFAS and DASS-21 took up the final fifteen minutes.

The study has been approved by the ethics committee of PBCCEH, which sanctioned that the study should be conducted within the medical unit (266/22.09.2021). Permissions were also obtained from the Scientific Research Ethics Commission of "Victor Babes" University of Medicine and Pharmacy, Timisoara (47/01.09.2021). A written consent was obtained from participants after explaining the study's goal to them before they filled out the questionnaires.

2.3 Measures

The following forms and questionnaires were used to collect the study's data:

(1) PIF

Researchers prepared the PIF based on research literature. The form consisted of questions related to pregnant women's socio-demographics (pregnant women's age, education, place of residence, marital status, working condition, socio-economic status) and obstetric characteristics (numbers of pregnancies, numbers of births, spontaneous/surgical abortion, health status, pathologies associated with pregnancy).

(2) MFAS

MFAS is an instrument for measuring prenatal attachment. In this paper, we used the Romanian-adapted and validated form of the MFAS scale by Chetu in her doctoral thesis [20]. This scale comprises 22 items and has a Cronbach α of 0.73. In our sample, Cronbach's α is 0.84, much closer to the value of the original instrument ($\alpha = 0.85$) [3].

The 22 items focused on the pregnant woman's feelings, attitude, and behaviour toward the foetus. It is a Likert-type scale with a score of between 1 and 5 attributed to each item (where "5" represents very intense feelings and "1" the absence of feeling). The minimum score for the total MFAS is 22, and the maximum is 110. In our study, the minimum score was 54, and the maximum was 109 points.

(3) DASS-21

The DASS-21 was developed by Lovibond and Lovibond [21] and is the short form of the DASS-42, a self-report scale designed to measure the negative emotional states of depression, anxiety, and stress. This scale is suitable for clinical settings for diagnosis and outcome monitoring, and for non-clinical settings as a mental health screener. DASS-21 has 21 items on this scale with four response options: 0 "Did not apply to me at all–Never", 1 "Applied to me to some degree, or some of the time–Sometimes", 2 "Applied to me to a considerable degree, or a good part of the time–Often" to 3 "Applied to me very much, or most of the time–Almost always". Each subscale (D-depression, A-anxiety, and S-stress) has seven items and a Chronbach's α between 0.6 to 0.74. The score ranges from 0 to 21. DASS, Manual for the Depression Anxiety Stress Scale, adaptation and standardization on the Romanian population by Perțe A and Albu M [22].

2.4 Data Analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 26 (IBM Corp, Chicago, IL, USA). Data analysis included descriptive and exploratory statistical analyses. We conducted preliminary descriptive analyses to test the characteristics of the data to decide the appropriate type of analysis for hypothesis testing. To investigate hypotheses 1, 2, and 3, we used the two-way Pearson correlation; for hypotheses 4, 5, and 6, we used *t*-test; and for hypothesis 7, we used one-way analysis of variance (ANOVA).

3. Results

After analysing the sociodemographic details of the expectant mothers, it was found that 50% were between 18 and 30 years old and 50% were over 30. Most patients came from urban areas (60%); 35.5% had high school education, but a similar percentage (32%) had graduate school education. Working conditions were approximated to low-risk in 55% of cases; only 1 patient declared high-risk working conditions. The socio-economic conditions were appreciated as good, satisfying and very good in most cases. In 8.5% of the questionaires, the patients stated that they live in poor socio-economic conditions (Table 1).

In the analysis of the data from the MFAS, DASS-21-D (Depression Anxiety Stress Scale, Depression subscale), DASS-21-A (Depression Anxiety Stress Scale, Anxiety subscale), DASS-21-S (Depression Anxiety Stress Scale, Stress subscale), 4 extreme scores were identified and subsequently eliminated from the statistical analyses. Therefore, 196 responses were analyzed in the correlation analyses. After the elimination of the 4 extreme scores, the dis-

Table 1. Socio-demographic characteristics of the participants.

Baseline characteristic	Full sample	
	N	%
Age group		
≤30 years	100	50.0
>30	100	50.0
Residence type		
Urban	120	60.0
Rural	80	40.0
Educational level		
Primary school	12	6.0
Middle school	30	15.0
Vocational school	8	4.0
High school	71	35.5
Graduate school	64	32.0
Postgraduate degree	15	7.5
Working conditions		
Low-risk	110	55.0
Medium-risk	89	44.5
High-risk	1	0.5
Socio-economic conditions		
Very good	17	8.5
Good	81	40.5
Satisfying	85	42.5
Poor	17	8.5

tribution of the data turned out to be normal, with the Skewness values falling within the normal limits [–2; 2] [23].

We performed two-way Pearson correlation to test the correlation between maternal-foetal attachment and depression. In making this correlation, we used scores from the MFAS and depression subscales from DASS-21. A statistically negative and insignificant relationship was identified (r (194) = –0.04, $p = 0.53$, $p > 0.05$). We performed two-way Pearson correlation to test the correlation between maternal-foetal attachment and anxiety. In order to perform this correlation, we used the scores from the MFAS and anxiety subscales from DASS-21. A statistically negative and insignificant relationship was identified (r (194) = –0.12, $p = 0.09$, $p > 0.05$). We performed two-way Pearson correlation to test the correlation between maternal-foetal attachment and stress. In order to test the materno-foetal attachment, we used the scores from the MFAS and stress subscales from DASS-21. A statistically negative and insignificant relationship was identified (r (194) = –0.04, $p = 0.51$, $p > 0.05$) (Table 2).

We used the independent sample *t*-test for hypotheses 4, 5, and 6. 1 extreme score was found throughout the data analysis process, and it was removed from all statistical analyses. As a result, the comparison analysis examined 199 replies.

To find out if there are any variations in the degree of materno-foetal attachment between women who live in urban areas and those who live in rural areas, we used the *t*-test

Table 2. Correlation between maternal-foetal attachment and mother's mental health.

Variable	n	M	SD	1	2	3	4
1. MFAS	196	85.05	9.18	0.84			
2. DASS-21-D	196	7.84	6.52	–0.04	0.74		
3. DASS-21-A	196	7.65	6.04	–0.12	-	0.71	
4. DASS-21-S	196	8.03	5.96	–0.04	-	-	0.6

Note: MAFS, Maternal-foetal attachment scale; DASS-21-D, Depression, Anxiety, and Stress Scale, Depression subscale; DASS-21-A, Depression, Anxiety, and Stress Scale, Anxiety subscale; DASS-21-S, Depression, Anxiety, and Stress Scale, Stress subscale; Cronbach's α coefficients are shown on the main diagonal. M, mean; SD, standard deviation.

for independent samples. The group with urban residence (N = 119, mean (M) = 84.65, standard deviation (SD) = 9.22) and the group with rural residence (N = 80, M = 86.16, SD = 8.58) do not differ statistically significantly (t (197) = –1.18, $p = 0.24$, $p > 0.05$). Next, we applied the *t*-test for independent samples to determine if there are differences in the level of materno-foetal attachment between women with higher education and those without. There were no statistically significant differences t (197) = 0.45, $p = 0.63$, $p > 0.05$ between the group with higher education (N = 120, M = 85.48, SD = 9.61) and the group without higher education (N = 79, M = 84.91, SD = 7.98).

Next, we tested if there were any variations in the degree of maternal-foetal attachment between women under 30 and those over 30 using the *t*-test for independent samples. Between the group under 30 years old (N = 109, M = 84.93, SD = 9.22) and the group over 30 years old (N = 90, M = 85.66, SD = 8.72), there are no statistically significant differences (t (197) = –0.57, $p = 0.56$, $p > 0.05$).

Table 3 shows no statistically significant differences in the comparison analyses regarding MAFS.

Table 3. *T*-test results and descriptive analysis for MAFS by residence, education level, and age.

MAFS	Group								
	Group 1			Group 2					
	M	SD	n	M	SD	n	t	df	*p*
Residence	84.65	9.22	119	86.16	8.58	80	–1.18	197	0.24
Education	85.48	9.61	120	84.91	7.98	79	0.45	197	0.63
Age	84.93	9.22	109	85.66	8.72	90	0.57	197	0.56

M, mean; SD, standard deviation; df, degrees of freedom.

To test the hypothesis 7, we used the ANOVA test. The participants were divided into the following groups: with poor socio-economic conditions (N = 17), satisfactory (N = 85), good (N = 81), and very good (N = 16) (Table 4).

The results (Table 5) indicate that there are significant differences between the 4 groups, F (3, 1950) = 2.99, $p = 0.03$, $p < 0.05$. The highest level of maternal-foetal attach-

Table 4. Descriptive analysis results for analysis of variance (ANOVA).

MAFS	Group											
	Group 1			Group 2			Gorup 3			Group 4		
	poor			satisfying			good			very good		
	M	SD	n	M	SD	n	M	SD	n	M	SD	n
Socio-economic conditions	85.26	9.49	17	86.14	8.79	85	86.02	9.22	81	80.38	5.98	16

ment was identified in the group with satisfactory socio-economic conditions (M = 86.14, SD = 8.79), followed by the group with good conditions (M = 86.02, SD = 9.22).

Table 5. Results for ANOVA.

	Sum of Square	df	Mean Square	F
Between Groups	702.86	3	1073.4	2.99*
Within Groups	15279.1	195	22.89	
Total	15981.9	198		

*$p < 0.05$. F = variation between sample means/variation within the samples, F-test.

4. Discussion

This study aimed to evaluate maternal-foetal attachment during the second- and third-trimesters of pregnancy, and how it can be influenced by the mother's mental health, socio-economic context, and demographic data such as age, residence, and education in a city in western Romania.

Some recent studies suggest a relationship between depression and anxiety during pregnancy and maternal-foetal attachment. Hart and McMahon found that women with low-quality maternal-foetal attachment reported significantly higher levels of anxiety and depression [24]. However, our study found no correlation between prenatal attachment scores, depression, anxiety, and stress.

Furthermore, no significant correlation was found between maternal-mental health and MFAS. This result suggests that pregnant women usually adapt to the changes occurring during pregnancy. However, Abasi *et al.* [25] indicated that high levels of prenatal attachment bond were related to less anxiety, stress, and depression, thereby contributing to better female mental health. Some pathologies associated with pregnancy, such as hypertension, diabetes mellitus, can influence maternal-foetal attachment [26]. The foetal malformation can cause stress, which can influence the mother-child relationship. In our study, no foetal malformation was identified.

Research has suggested that prenatal attachment bond motivates good health practices during pregnancy, facilitates adaptation to the role of parenthood, and may even serve as a protective factor against perinatal depression. This theoretical approach to pregnancy is deemed necessary across the disciplines of medicine, psychiatry, and social work, both academic and clinical [5].

Research shows that no significant relationship exists between the mother's age and the level of prenatal attachment throughout pregnancy [27]. Malm *et al.* [28] identified that pregnant women in the younger age group showed higher levels of prenatal attachment than those in the older age group. However, in studies by Rubertsson *et al.* [29], women over 25 showed low attachment. Our study did not identify a significant difference regarding the age level and the relationship between maternal-foetal attachment.

In our study, following the comparisons between the economic status and the MFAS, it was found that the extremes (very good and poor socio-economic conditions) fall in the developed attachment category. Regarding pregnant women with satisfactory and good incomes, the attachment bond advocates for very well-developed socio-economic conditions. Following these results, it was concluded that moderate incomes positively influence the attachment scale. Pregnancy-related income status and mother-infant bonding have not been linked, according to similar research [30].

In terms of differences in the level of maternal-foetal attachment based on the level of education, the results of the current study do not report a significant difference. According to studies by Ustunsoz *et al.* [31], prenatal attachment bonding and education have been found to correlate positively. Furthermore, these authors claimed that prenatal attachment bonding was reduced in women with less education.

A study based on Hungarian women proposes a two-factor structure of maternal-foetal attachment to distinguish between behavioural and mental components of the maternal-foetal relationship. The result shows that maternal attachment to their fetuses is not significantly influenced by psychosocial traits or socio-demographic status [32]. On the contrary, some studies have shown that pregnant women who were financially secure, worked, had children of the desired sex, and received support from their husbands during pregnancy exhibited higher levels of attachement during pregnancy. An important conclusion is that it is possible to identify mothers and newborns at risk by understanding the variables that influence attachment and assessing the degree of attachment in expectant mothers [33].

Prenatal attachment theory is essential to academic and clinical medicine, psychiatry, and social work, as research indicates that it promotes healthy behaviours during pregnancy, helps with adjusting to the role of parent-

hood, and may even act as a protective factor against perinatal depression [5]. Digital technology offers facilities for creating educational applications intended to guide specialists from different medical fields [34,35]. Considering the multidisciplinarity of the topic addressed, the development of dedicated computer applications could positively impact the management of these cases. Studies prove that the fact that the patient sees the ultrasound images of the fetus has a good influence on the postpartum mother-child relationship. The generation of virtual reality images that present the fetus in a form as close as possible to reality has been proven to increase maternal-foetal attachment [36].

4.1 Study Implications

The current study supports several earlier studies conducted in various cultures that assert that the pregnant woman's age, socio-economic status, place of residence, and level of education play no significant role in shaping the maternal-foetal bond.

Detecting psychological disorders can categorize the pregnancy into the high-risk group, which requires a good collaboration of the entire team involved in the follow-up and completion of the pregnancy in good conditions, namely the obstetrician, neonatology, anaesthetist, psychologist, and, if necessary, the psychiatrist. It is recommended that these cases be referred to high-level maternity hospitals equipped with trained of all the specialists involved in the patient care process, aimed to reduce the number of possible complications.

4.2 Limitations of the Study

One main limitation of the current study is the small sample size; the patients were recruited from a single medical unit with a low percentage of associated pathologies. Additional limitations are related to the cross-sectional design, study selection bias, and reliance on self-assessment measures.

In addition, only three working instruments were used: MFAS, DASS-21, and PIF. It is recommended that further studies should be conducted in different settings or different cultures, with more working instruments, and several medical units.

A wide range of intricate elements influences the formation of a healthy mother-foetal bond. Thus, another limitation of the current study is that it ignores factors like the degree of support from one's life partner, prenatal planning, and the desire to have children. It would also be helpful to look into these topics in future studies.

We already know that the emotional health of the mother during pregnancy affects the relationship between her and the fetus, which has significant effects on postnatal bonding. Pregnancy-related anxiety and depressive disorders may have a detrimental impact on a woman's bond to her unborn child. The general pregnant population has been the subject of most research, with less attention paid to high-risk pregnancies, which are linked to higher rates of mental disorders. To be able to draw more detailed conclusions about these aspects, we need to investigate a population of high-risk gravid women.

5. Conclusions

This study highlights the importance of social and mental health factors related to the attachment bonding between the mother and the unborn child. We concluded that social factors such as age, level of education, socio-economic conditions, and residence do not statistically significantly influence the scale of maternal-foetal attachment. However, the mother's mental health did not significantly correlate with the attachment bond evaluated by MFAS. In our study, prenatal attachment bond scores, depression, anxiety, or stress were not correlated.

Abbreviations

PIF, Personal Information Form; DASS-21, Depression Anxiety Stress Scale 21; DASS-21-D, Depression, Anxiety and Stress Scale, Depression subscale; DASS-21-A, Depression, Anxiety and Stress Scale, Anxiety subscale; DASS-21-S, Depression, Anxiety, and Stress Scale, Stress subscale; r, correlation coefficient; *p*, level of signification; MFAS, Maternal-Foetal Attachment Scale; COG, Clinic of Obstetrics and Gynecology; PBCCEH, "Pius Brinzeu" County Clinical Emergency Hospital.

Availability of Data and Materials

All datasets are available by e-mail to the corresponding author.

Author Contributions

Conceptualization, DM and BCB; Acquisition, MC, AG and ABC; Analysis, VE, AL and VB; Investigation, LH and AP; Resources, AP, VB and BCB; Interpretation, BCB, DL, EB; Writing—original draft preparation, VE, ABC, BCB, DM, AG, AL and EB; Writing—review and editing, LH, VB, EB, DL, AP and MC; Visualization, AG and AL; Supervision, EB; Project administration, DL. Finally, all authors read the article and approved publishing the final version. Each author has agreed to be responsible for all aspects of the work, ensuring that questions about the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethics Approval and Consent to Participate

The ethics committee of PBCCEH agreed that the study should be carried out within the medical unit (266/22.09.2021). Permissions were also obtained from the Scientific Research Ethics Commission of "Victor Babes" University of Medicine and Pharmacy, Timisoara (47/01.09.2021). Written consent was received after informing participants regarding the purpose of the study before filling in the questionnaires.

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Conflict of Interest

The authors declare no conflict of interest. Marius Craina and Elena Bernad are serving the Guest editors of this journal. We declare that Marius Craina and Elena Bernad had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to George Daskalakis.

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