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The Correlation Between Mother-Infant Bonding and Postpartum Depression in Women with A History of Infertility

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ABSTRACT

Objective: This study investigated the correlation between mother-infant bonding and postpartum depression in women with a history of infertility. **Methods**: The sample consisted of 169 women divided into two: infertile group (n=56) and fertile group (n=112). Data were collected using a descriptive information questionnaire, the Edinburgh Postnatal Depression Scale (EPDS), and the Mother-to-Infant Bonding Scale (MIBS). **Results:** The fertile and infertile groups had a mean age of 28.95±3.38 and 36.55±3.55, respectively (p=0.001). The infertile group had a higher mean MIBS score (3.73±2.91) than the fertile group (1.50±1.29) (p=0.001). However, there was no significant difference in EPDS scores between the two groups (p>0.05). Moreover, there was a positive correlation between MIBS and EPDS score in the fertile group (r= 0.354, p=0.001), suggesting that the higher the risk for postpartum depression, the lower the mother-infant bonding. There was no correlation between MIBS and EPDS score in the infertile group (p>0.05). **Conclusion:** Future studies should recruit larger samples of infertile women with cultural and ethnic diversity and take confounding factors into account to investigate the relationship between postpartum depression and mother-infant bonding.
Keywords: Infertility History, Postpartum Depression, Mother-Infant Bonding.

İnfertilite Hikayesi Olan Kadınlarda Anne Bebek Bağlanması ve Postpartum Depresyon Arasındaki İlişki

ÖZ

Amaç: Bu çalışmada infertilite hikayesi olan kadınlarda anne bebek bağlanması ve postpartum depresyon arasındaki ilişki incelenmiştir. **Gereç ve Yöntem:** Çalışmanın örneklemini infertil grup (n=56) ve fertil grup (n=112) olmak üzere toplam 169 kadın oluşturmuştur. Veriler Tanımlayıcı Bilgi Formu, Edinburg Postpartum Depresyon Skalası (EPDS) ve Anne-Bebek Bağlanma Ölçeği (ABBÖ) kullanılarak toplanmıştır. **Bulgular:** Fertil ve infertil grupların yaş ortalaması sırasıyla 28.95±3.38 ve 36.55±3.55 idi (p=0.001). İnfertil grupta ABBÖ puan ortalamasının (3.73±2.91), fertil gruba göre daha yüksek (1.50±1.29) olduğu belirlenmiştir (p=0.001). Ancak iki grup arasında EPDS ortalama puanları yönünden anlamlı bir fark bulunmamıştır (p>0.05). Bunun yanı sıra, fertil grupta ABBÖ ve EPDS ortalama puanları arasında pozitif bir ilişki olduğu belirlenmiştir (r=0.354, p=0.001). Bu bulgu doğum sonrası depresyon riski ne kadar yüksek ise anne ve bebek bağlanma düzeyinin o kadar düşük olduğunu göstermiştir. İnfertil grupta ise ABBÖ ve EPDS ortala puanları arasında ise bir ilişki belirlenmemiştir (p>0.05). **Sonuç:** Kültürel ve etnik çeşitliliğin bulunduğu daha büyük gruplarda infertil hikayesi olan kadınlarda olası karıştırıcı faktörlerin hesaba katılarak, postpartum depresyon ve anne bebek bağlanma ilişkinin değerlendirildiği çalışmalara ihtiyaç bulunmaktadır.
Anahtar Kelimeler: İnfertilite Öyküsü, Postpartum Depresyon, Anne-Bebek Bağlanması.

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INTRODUCTION

Infertility is a complicated crisis that adversely affects social and sex life, marital relations, emotional well-being, and plans (Akyuz et al., 2010; Sahin & Gursoy, 2020). Women, especially in traditional societies, are valued and respected only when they bear children. Giving birth is also considered a sign of sexual potency (Sahin & Gursoy, 2020). Couples diagnosed with infertility experience psychosocial problems (Akyuz et al., 2010; Hess et al., 2018). Besides, infertility diagnosis and treatment are a long, painful, and financially burdensome process (Akyuz et al., 2010). Research shows that women with a history of infertility are more probably to experience depression, anxiety, isolation, and loss of control than fertile women (Hess et al., 2018; Safaei Nezhad et al., 2018). Women who conceive after infertility treatment experience more anxiety and depression than those who conceive spontaneously (Akyuz et al., 2010; Olshansky & Sereika, 2005).

Postpartum is a period of physiological changes and adaptation to new roles. The transition to motherhood can be stressful. It is more challenging for women with a history of infertility than for those who conceive spontaneously (Akyuz et al., 2010). Research shows that women with a history of infertility who experience pregnancy-specific anxiety and depression are more vulnerable to postpartum depression (PPD) (Akyuz et al., 2010; Olshansky & Sereika, 2005). PPD is defined as "a major depressive episode that can manifest itself during the first four weeks after giving birth and is characterized by dramatic mood swings that can occur up to one year later" (American Psychiatric Association, 2021). The worldwide prevalence of PPD is 5.5% to 25% (Soderquist et al., 2009). The prevalence of PPD in women with a history of infertility is 12.9% to 25% (Lee et al., 2011; Lynch & Prasad, 2014).

PPD adversely affects mother-infant bonding (MIB) (Sliwerski et al., 2020; Forman et al., 2007). Mothers with depression will probably suffer more from stress, view their children in a more negative light, and have a less intense relationship with and less secure attachment with them than those without depression (Forman et al., 2007). However, there is no published research investigating the correlation between MIB and PPD in women with a history of infertility. MIB disorders deteriorate mother-child relationships in the long term (Lehning et al., 2019). Therefore, it is essential to identify the risks affecting MIB quality early and support mothers with a history of infertility.

The research questions were as follows:

Q.1. Is there a significant difference in Mother-to-Infant Bonding Scale (MIBS) scores between women who conceive spontaneously and those who conceive after infertility treatment?

Q.2. Is there a significant difference in Edinburgh Postnatal Depression Scale (EPDS) scores between women who conceive spontaneously and those who conceive after infertility treatment? Q.3. Is there a correlation between MIBS and EPDS scores in women who conceive spontaneously and those who conceive after infertility treatment?

MATERIALS AND METHODS

Population and sampling

This comparative descriptive study was carried out between September 2019 and June 2020 at a Gynecology Training and Research Hospital in Ankara. Prior and post-hoc power analysis were both performed based on two independent groups. Expected Cohens' f value for effect size was 0.2 which is considered as small effect size. For a type I error of 0.05 and an effect size of 0.2 with a minimum required power of 80%, the estimated total sample size was 152, including the infertile group (IG, n=51) and the fertile group (FG, n=102). Considering 10% sample loss, a total of 168 people, 56 in the infertile group and 112 in the fertile group, were included in the study. Power analysis was performed again at the end of the study based on mean MIBS scores and standard deviations. Post-hoc effect size of the study was calculated as 0.92 and post-hoc power 95%. For Power analyses G-power package version 3.1.9.2 was used.

Criteria for inclusion

The inclusion criteria were as follows: (1) literate, (2) Turkish speakers, (3) carrying one fetus, (4) giving birth by C-section, (5) being primiparous, (6) no having pregnancy-related complication (preeclampsia, gestational diabetes, bleeding, epilepsy, etc.); (7) no congenital malformation in the infant, (8) no mental health problems (depression, anxiety, severe psychosocial problems, etc.), (9) filling out the forms completely, and (10) voluntary.

We pre-interviewed 250 women until we reached the target sample size. A total of 168 women met the inclusion criteria [FG (n=112) and IG (n=56)]. The remaining 82 women were excluded because they could not speak Turkish (n=13), were illiterate (n=19), multiparous (n=25), or had a vaginal delivery (n=22). Twelve participants did not turn up, and therefore, the final sample consisted of 156 women in the second stage [FG (n=104) and IG (n=52)].

Data collection tools

The Descriptive Information Questionnaire-1 (DIQ-1) consisted of 15 items on the sociodemographic and obstetric characteristics of women who conceived spontaneously (Akyuz et al. 2010; Lee et al. 2011).

The Descriptive Information Questionnaire-2 (DIQ-2) consisted of 20 items on the sociodemographic and obstetric characteristics of women who conceived after ART (Akyuz et al., 2010; Lee et al., 2011; Lynch & Parasad, 2014).

The Edinburgh Postnatal Depression Scale (EPDS) was developed by Cox et al. (1987) to evaluate depressive symptoms. The EPDS was adapted to Turkish by Engindeniz et al. (1996). It consists of 10 items scored on a four-point Likert-type scale (min=0, max=30). Higher scores indicate more severe symptoms of depression. Engindeniz et al. (1996) reported the Cronbach's alpha as 0.79, 0.83 in this study.

The Mother-to-Infant Bonding Scale (MIBS) was developed by Taylor et al. (2005) to identify the level of maternal bonding. The MIBS was adapted to Turkish by Karakulak et al. (2007). It consists of eight items scored on a scale of 0 to 3. The total score ranges from 0 to 24, with higher scores indicating lower MIB. The scale has a Cronbach's alpha of 0.71 in the 12th week postpartum (Taylor et al., 2005) and 0.68.3 in the 8th-12th week postpartum (Karakulak et al., 2007). The Cronbach's alpha was 0.70 (in the 8th-12th week postpartum) in this study.

Procedure

The research consisted of two stages. First, we checked the files of all women admitted to the obstetric outpatient clinic for routine follow-up in the fourth-sixth weeks postpartum and determined those who got pregnant spontaneously and those who got pregnant after ART (in vitro fertilization, artificial insemination, etc.). The fertile group (FG) consisted of women who conceived spontaneously, while the infertile group (IG) consisted of those who got pregnant after ART. The FG participants completed the DIQ-1 and EPDS, while the IF participants completed the DIQ-2 and EPDS. We also received permission from participants to log their contact details.

Second, we contacted all participants by phone to set dates for their visits to the Newborn and Child Outpatient Clinic for routine newborn follow-up in the eighth-twelfth week postpartum. Both groups completed the MIBS (Figure 1).

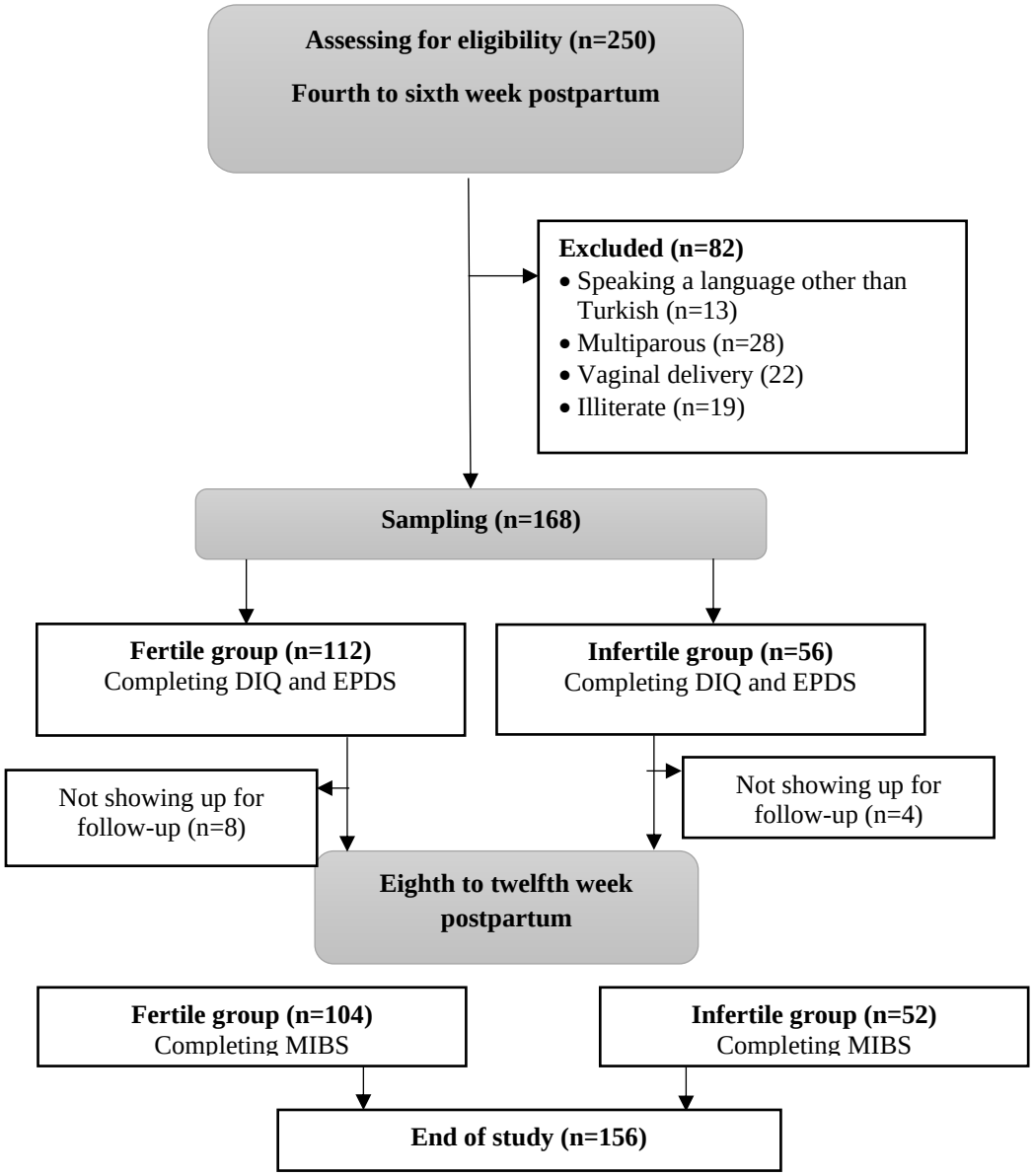

Figure 1. Flow diagram.

Data analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS, v. 23.0) at a significance level of 0.05. Percentage, median (minimum, maximum), mean (standard deviation), chi-square, and Mann-Whitney U test were used for analysis. Normality test of the study was checked using the Shapiro-Wilk test. The Spearman correlation was used to determine the correlation between scale scores.

Ethical considerations

The study was approved by an Ethics Committee (approval date/number: February 23, 2018/51). Permission was obtained from the hospital management. Prior to participation, all women were informed of the research purpose, confidentiality, and their right to withdraw. Informed consent (including permission to be interviewed) was obtained from those who agreed to participate according to the guidelines presented in the Declaration of Helsinki.

RESULTS

Demographic characteristics

Table 1 shows the socio-demographic and obstetrics characteristics of the participants. The fertile group was younger (28.95±3.38) than the infertile group (36.55±3.55) (p=0.001). The mean age of marriage was significantly lower in the fertile group (24.49 ± 2.48) than in the infertile group (28.00±2.66 years) (p=0.001). Thirty-eight FG (36.5%) and 24 IG (46.2%) participants breastfed their babies within the first hour postpartum. The difference was statistically significant (p<0.05). The majority of FG participants (60.0%) received support from their relatives and friends, while slightly more than half the IG participants (53.9%) received support from their spouses/partners in the first four weeks postpartum (p<0.05). The two groups were demographically similar in terms of education, family type, employment, and satisfaction with the newborn's sex (p>0.05). Though not shown in Table 1, the IG participants had a mean infertility treatment of 4.0±1.83 years (min=1-max=10). Thirty-four percent of the cases were female infertility due to female-related problems.

Distribution of scale scores

The infertile group (1.50±1.29) had a lower mean MIBS score than the fertile group (3.73±2.91) in the eighth to twelfth week postpartum (p=0.001). This result showed that the IG participants had higher levels of MIB than their FG counterparts. There was no significant difference in EPDS scores between the infertile (12.01±3.39) and fertile groups (13.45±6.31) in the fourth to sixth week postpartum (p>0.05) (Table 2).

There was a positive correlation between EPDS and MIBS scores in the fertile group (r=0.354, p=0.001), suggesting that the higher the risk for PDD, the lower the MIB. There was no correlation between EPDS and MIBS scores in the infertile group (p>0.05) (Table 3).

DISCUSSION

This study examined the correlation between MIB and PPD in women who conceived spontaneously and those who conceived after infertility treatment. Postpartum depression (PPD) was assessed using the EPDS in the fourth to sixth week postpartum, while mother-infant bonding (MIB) was assessed using the MIBS in the eighth to twelfth week postpartum. This study showed that the IG participants had higher levels of MIB than their FG counterparts (p<0.05). There was no significant difference in EPPD scores between the infertile and fertile groups in our study (p>0.05). We also found a positive correlation between EPDS and MIBS scores in the fertile group. It is noteworthy that there was no correlation between EPDS and MIBS scores in the infertile group.

The average age of marriage and childbearing is rising worldwide. Fertility naturally declines as women get older (Haliloğlu et al., 2014), and infertile women are more likely to enter into marriage later than fertile women (Akyüz et al., 2010). In the last two decades, Turkey has witnessed an increase in the age of marriage and fertility because women today are participating in social and economic life and pursuing their career goals more actively than before. For women, the age of marriage increased from 22 in 2000 to 25 in 2019. Similarly, the age of childbearing increased from 26 in 2000 to 29 in 2019 (TÜİK, 2019). Our results showed that the age of childbearing and marriage among fertile women was close to the national average but lower than that in women with a history of infertility. It is thought that there is relationship between fertility and maternal age.

Infertility diagnosis has adverse psychosocial impacts on couples (Akyuz et al., 2010; Hess et al., 2018). Besides, infertility diagnosis and treatment is a long, painful, and financially burdensome process (Akyuz et al., 2010). Women receiving infertility treatment are extremely worried about the process and treatment outcomes (Hasanpoor-Azghdy et al., 2014). Infertile women have difficulty adapting to the postpartum period and assuming parenting roles due to past experiences and fear of losing their babies (Ranjbar et al., 2015). There are contradicting results regarding the prevalence of PPD among women who conceive spontaneously or after infertility treatment. Ross et al. shows that women who conceive after infertility treatment have a higher prevalence of PPD than those who

conceive spontaneously. On the other hand, some other studies report similar rates of PPD in the two groups (Akyuz et al., 2010; Gressier et al., 2015). There was no significant difference in EPPD scores between the infertile and fertile groups in our study (p>0.05). Small et al. (2003) argue that women deprived of social support in the postpartum period are more likely to experience psychosocial problems and PPD. In our study, the infertile and fertile groups had similar levels of depression, which may be because most women in both groups received support from their spouses/partners or their relatives/friends in the postpartum period.

It was determined that women in the infertile group received more support from their spousal/partners, and women in the fertile group received support from their relatives and friends in this study. According to Hasanpoor-Azghdy et al. (2014), infertile women keep their diagnosis and treatment to themselves. Akizuki and Kai (2008) maintain that spousal/partner support is essential for infertile women to become less dependent on others. In Turkish society, bearing children results in strong social approval and respect and is considered a sign of sexual potency (Sahin & Gursoy, 2020). Koçyiğit (2012) found that infertile Turkish women described themselves as "dying trees" and "barren land." Women stated that they were the subject of peer pressure and were bombarded with questions about having kids. Therefore, most couples with a history of infertility do not share their story with family or friends (Koçyiğit, 2012). In our study, women in the infertile group received support primarily from their spouses/partners. This result also suggests that infertile couples choose to go through the diagnosis and treatment process by themselves without sharing it with their family and friends.

Table 1. Socio-demographic and obstetrics characteristics (n=156).

	Fertile group (n=104)		Infertile group (n=52)		Test value	p
Characteristics	**n**	**%**	**n**	**%**		
Age, y, x̄±SD	28.95±3.38		36.55 ± 3.55		5.078[a]	0.001**
Age of marriage, y, x̄±SD	24.49±2.48		28.00 ± 2.66		6.877[a]	0.001**
Educational status					0.186[b]	0.667
<High school	21	20.2	9	17.3		
≥High school	83	79.8	43	82.7		
Employment status					0.321[b]	0.571
Employed	55	52.9	25	48.1		
Unemployed	49	47.1	27	51.9		
Family type					2.550[b]	0.110
Nuclear	92	88.5	41	78.8		
Extended	12	11.5	11	21.2		
First breastfeeding					9.625[b]	0.008*
Within the first hour	38	36.5	24	46.2		
First 1-2 hours	49	47.1	28	53.8		
First 2-4 hours	17	16.3	-	-		
Satisfaction with the newborn's sex					2.097[b]	0.148
Yes	74	71.2	31	59.6		
No	30	28.8	21	40.4		
Source of support for newborn care[c]					4.210[b]	0.040*
Spouse/Partner	52	40.0	35	53.9		
Relative/Friend	78	60.0	30	46.1		

[a]Mann-Whitney U test, [b]Chi-square test, [c]Percentages are based on n. *p<0.05, **p<0.001.

Table 2. EPDS and MIBS scores (n=156).

	Fertile group (n=104)		Infertile group (n=52)		Test value	p
Scales	$\bar{x}$	**SD**	$\bar{x}$	**SD**		
MIBS	3.73	2.91	1.50	1.29	-5.367[a]	0.001*
EPDS	13.45	6.31	12.01	3.39	-1.754[a]	0.080

*MIBS, Mother-to-Infant Bonding Scale; EPDS, Edinburgh Postnatal Depression Scale. [a]Mann-Whitney U test. *$p<0.001$.

Table 3. Correlation between MIBS and EPDS scores.

Scales	Fertile group (*n*=104)				Infertile group (n=52)			
	MIBS		EPDS		MIBS		EPDS	
	r[a]	p	r[a]	p	r[a]	p	r[a]	p
MIBS	1		0.354	0.001*	1		0.082	0.563
EPDS	0.354	0.001*	1		0.082	0.563	1	

MIBS: Mother-to-Infant Bonding Scale; **EPDS:** Edinburgh Postnatal Depression Scale. [a] Spearman correlation. *p< 0.001.

Quality mother-infant bonding is a prerequisite for healthy relationships in the future (Barker et al., 2017). According to Bowlby's attachment theory (1982), attachment during infancy shapes an individual's life and affects their relationships in the future. Women with a history of infertility have difficulty transitioning to the maternal role during pregnancy. Women who conceive after infertility treatment may have special needs because they generally have concerns about motherhood and MIB (Bernstein et al., 1994). Women who become mothers after infertility treatment expresses ambivalent emotions of love and hate towards their babies. They also think that they have no right to complain about their babies (Sliwerski et al., 2020). Donarelli et al. (2012) shows that women with a history of infertility have lower MIB than those who conceive spontaneously. Our IG participants also had higher MIB than their FG counterparts ($p<0.05$). The baby is most sensitive in the first hours after birth. During this period, mother-infant interaction is critical for secure MIB (Donarelli et al., 2012). In our study, the IG participants may have established a more secure MIB because they started to breastfeed earlier and thus interacted more with their babies than their FG counterparts. We also think that the IG participants may have a more secure MIB because their pregnancies were planned, and they had wanted to have babies for a long time.

Research shows that PPD is negatively correlated with MIB, suggesting that the higher the levels of depression, the less the MIB (Forman et al., 2007; 2020; Nieto et al., 2017). We also found a positive correlation between EPDS and MIBS scores in the fertile group ($r=0.354$, $p=0.001$), indicating the higher the MIB in the FG participants. It is noteworthy that there was no correlation between EPDS and MIBS scores in the infertile group. There is no published research investigating the correlation between PPD and MIB in women with a history of infertility. Therefore, more evidence-based studies with larger multicultural sample sizes are warranted to determine the relationship between PPD and MIB in women receiving infertility treatment.

Limitations of study

This study had two limitations. First, it was conducted only in one center, and therefore, the results cannot be generalized to the general population. Second, the sample consisted only of women who underwent a C-section because 97% of pregnant women receiving ART at the center undergo a C-section. We thought that the delivery type could affect the results, and therefore, we composed the fertile group from women who underwent a C-section.

CONCLUSION

The IG participants had higher levels of MIB than their FG counterparts. The risk for PPD was similar in both groups. There was no correlation between PPD and MIB in the infertile group. Future studies should recruit larger samples of infertile women with cultural and ethnic diversity and take confounding factors into account to investigate the relationship between PPD and MIB.

Conflict of Interest

The authors declare no potential conflicts of concerning the research, authorship and/or publication of this article.

Author Contributions

Plan, Design: SK, SK, EÖ; **Materials and methods:** SK, EÖ; **Data analysis and interpretation**: EÖ; **Writing and corrections:** SK, SK, EÖ.

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