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Maternal Psychological Responses to Retinopathy of Prematurity Diagnosis and Treatment: Anxiety, Rumination, and Resilience–A Cross-Sectional Study

Prematüre Retinopatisi Tanısı ve Tedavisine Annelerin Psikolojik Tepkileri: Kaygı, Ruminasyon ve Dayanıklılığın İncelenmesi–Kesitsel Araştırma

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ABSTRACT

Background: This study investigated the psychological impact of retinopathy of prematurity (ROP) diagnosis and treatment on mothers, focusing on anxiety, intolerance of uncertainty, rumination, resilience, and parenting self-efficacy.

Materials and Methods: This cross-sectional study included 267 mothers of preterm infants who underwent routine ROP screening. Participants were categorized into three groups: mothers of infants with ROP not requiring treatment (n = 93), mothers of infants with ROP requiring treatment (n = 47), and mothers of infants without ROP (n = 127). Validated scales, including the State–Trait Anxiety Inventory, Edinburgh Postnatal Depression Scale, Intolerance of Uncertainty Scale, Connor–Davidson Resilience Scale, and Perceived Maternal Parenting Self-Efficacy Scale, were used for assessment. Statistical analyses included analysis of variance, Mann–Whitney U tests, and correlation analyses.

Results: Mothers in the ROP–no treatment and ROP–treated groups exhibited significantly higher levels of state anxiety ($p < 0.001$) and negative rumination ($p = 0.007$) than those in the no ROP group. Anxiety levels were highest in the ROP–no treatment group, whereas mothers in the ROP–treated group demonstrated significantly greater psychological resilience ($p = 0.044$). No significant group differences were observed in depressive symptoms or intolerance of uncertainty. Higher psychological resilience was significantly associated with lower levels of anxiety ($p < 0.001$) and rumination ($p < 0.05$).

Conclusion: ROP diagnosis and treatment have significant effects on maternal anxiety and resilience. Structured psychosocial interventions such as resilience training and cognitive reframing may alleviate maternal distress. These findings emphasize the need for integrated psychological support in the care of preterm infants with ROP.

Keywords: Retinopathy of prematurity, maternal anxiety, psychological resilience, rumination, parenting self-efficacy

ÖZ

Amaç: Bu çalışma, prematüre bebeklerin annelerinde retinopati prematürelik (ROP) tanı ve tedavi sürecinin psikolojik etkilerini; anksiyete, belirsizliğe tahammülsüzlük, ruminasyon, psikolojik dayanıklılık ve ebeveynlik öz-yeterliği odağında incelemeyi amaçlamıştır.

Gereç ve Yöntemler: Bu kesitsel çalışmaya, rutin ROP taramasından geçen 267 prematüre bebeğin annesi dahil edilmiştir. Katılımcılar üç gruba ayrılmıştır: tedavi gerektirmeyen ROP tanılı bebeklerin anneleri (n = 93), tedavi gerektiren ROP tanılı bebeklerin anneleri (n = 47) ve ROP tanısı olmayan bebeklerin anneleri (n = 127). Değerlendirmede Durumluk-Sürekli Kaygı Envanteri, Edinburgh Doğum Sonrası Depresyon Ölçeği, Belirsizliğe Tahammülsüzlük Ölçeği-12, Connor–Davidson Psikolojik Dayanıklılık Ölçeği ve Algılanan Maternal Ebeveynlik Öz-Yeterliği Ölçeği kullanılmıştır. İstatistiksel analizlerde varyans analizi, Mann–Whitney U testi ve korelasyon analizleri uygulanmıştır.

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öz

Bulgular: ROP–tedavi gerektirmeyen ve ROP–tedavi edilen gruplardaki annelerin durumluk anksiyete ($p < 0,001$) ve olumsuz ruminasyon ($p = 0,007$) düzeyleri, ROP olmayan gruba kıyasla anlamlı düzeyde daha yüksek bulunmuştur. Anksiyete düzeyleri en yüksek ROP–tedavi gerektirmeyen grupta saptanırken, ROP–tedavi edilen gruptaki annelerin psikolojik dayanıklılık düzeyleri anlamlı olarak daha yüksek bulunmuştur ($p = 0,044$). Depresif belirtiler ve belirsizliğe tahammülsüzlük açısından gruplar arasında anlamlı bir fark gözlenmemiştir. Daha yüksek psikolojik dayanıklılık düzeyleri, daha düşük anksiyete ($p < 0,001$) ve ruminasyon ($p < 0,05$) düzeyleri ile anlamlı olarak ilişkili bulunmuştur.

Sonuç: ROP tanı ve tedavi süreci, annelerin anksiyete düzeyleri ve psikolojik dayanıklılığı üzerinde anlamlı etkilere sahiptir. Dayanıklılığı artırmaya yönelik yapılandırılmış psikososyal müdahaleler (örneğin dayanıklılık eğitimi ve bilişsel yeniden çerçeveleme), maternal psikolojik sıkıntının azaltılmasına katkı sağlayabilir. Bu bulgular, ROP tanılı prematüre bebeklerin bakım sürecinde bütüncül psikolojik destek yaklaşımlarının gerekliliğini vurgulamaktadır.

Anahtar Kelimeler: Prematüre retinopatisi, anne kaygısı, psikolojik dayanıklılık, ruminasyon, ebeveynlik öz-yeterliliği

Introduction

Prematurity, which affects approximately 15 million infants annually, is a significant global health issue and a leading cause of neonatal morbidity and mortality. Retinopathy of prematurity (ROP) is a significant concern, as it remains one of the leading preventable causes of blindness in preterm infants worldwide (1). Advances in neonatal intensive care have improved the survival rates of preterm infants; however, this has also increased the risk of long-term health challenges, including neurological, auditory, and visual impairments (2,3).

While the medical challenges faced by preterm infants are well documented, the emotional and psychological burden on their parents, particularly mothers, remains underexplored. Caring for a preterm infant diagnosed with ROP can be overwhelming and marked by uncertainty, heightened anxiety, and the need for psychological resilience. These emotional challenges are further amplified during medical procedures, with some mothers reporting increased anxiety when witnessing their infant's discomfort and others experiencing relief by avoiding such situations (4–7). Lack of social support and low psychological resilience exacerbate these struggles, contributing to higher levels of anxiety and depression than those in the general population (8,9).

Previous studies have emphasized the role of parental support groups and educational interventions in improving maternal coping mechanisms (10,11). However, specific psychological constructs, such as intolerance of uncertainty, rumination, resilience, and parenting self-efficacy, remain insufficiently explored in the context of ROP. Intolerance of uncertainty, characterized by difficulty in managing unpredictable outcomes, is closely linked to stress and anxiety in medical settings (12). Rumination, particularly negative rumination (NRS), intensifies emotional distress by fostering repetitive and intrusive thoughts (13). Conversely, psychological resilience is a protective factor that enables individuals to adapt to and recover from adversity (14). Parenting self-efficacy, a parent's belief in their ability to effectively fulfill caregiving responsibilities, is another critical factor influencing maternal responses to ROP-related challenges (6,15).

This study aimed to examine the psychological impact of ROP diagnosis and treatment on the mothers of preterm infants. Specifically, we sought to compare levels of state anxiety, trait anxiety, rumination, intolerance of uncertainty, psychological resilience, and parenting self-efficacy among mothers in the ROP—no treatment, ROP—treated, and no-ROP groups.

Additionally, this study aimed to explore associations among maternal anxiety, depressive symptoms, rumination styles, psychological resilience, and parenting self-efficacy while adjusting for potential clinical confounders such as maternal education level and number of ophthalmologic examinations.

Based on the existing literature, we hypothesized that:

(1) Mothers in the ROP–no treatment and ROP–treated groups exhibited higher levels of state anxiety and rumination than did mothers in the ROP group.

(2) Mothers in the ROP–treated group demonstrated greater psychological resilience than mothers in the ROP–no treatment group.

(3) Higher psychological resilience and parenting self-efficacy were associated with lower anxiety and maladaptive cognitive processes across the sample.

Materials and Methods

This cross-sectional study included mothers of preterm infants whose infants underwent routine ROP screening at the ophthalmology clinic of a University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital between November 1 and December 20, 2024. Ethics committee approval was obtained from the University of Health

Sciences Türkiye, Başakşehir Çam and Sakura City Hospital, Institutional Clinical Research Ethics Committee prior to study initiation (decision number: KAEK-11/25.09.2024.167, dated: 06.11.2024). This study was conducted in accordance with the principles of the Declaration of Helsinki. Before participation, written informed consent was obtained from all participants, following the provision of comprehensive information regarding the objectives and scope of the study.

Participants and Group Classification

A total of 267 biological mothers of preterm infants who met the ROP screening criteria according to the International Classification of ROP (ICROP) guidelines were enrolled (16). Eligible infants were those born at ⩽32 weeks' gestational age and/or with a birth weight ⩽1500 g, or who had an unstable clinical course warranting ROP screening, as determined by the attending neonatologist. The infants were examined by two experienced ophthalmologists specializing in ROP. Based on the infant's final ROP status at the time of the survey (reflecting the current disease and treatment status rather than the initial diagnosis), mothers were categorized into three groups:

ROP–no treatment (n = 93): Mothers of infants diagnosed with any stage of ROP who did not require treatment until the survey date.

ROP–treated (n = 47): Mothers of infants with type 1 or aggressive posterior ROP who underwent treatment (intravitreal anti-vascular endothelial growth factor [VEGF], laser photocoagulation, or both).

No ROP (n = 127): Mothers of preterm infants who met the screening criteria but had never developed ROP at any examination or were documented as having mature retinal vasculature at their first examination.

The exclusion criteria were maternal illiteracy, pre-existing psychiatric disorders preventing reliable self-reporting, refugee or immigrant status limiting follow-up, suspected or confirmed syndromic conditions in the infant, a history of caring for another preterm infant, and inability to complete the study instruments. Only one mother per infant was included in this study.

ROP Screening Protocol

ROP screening was performed according to the ICROP recommendations. Examinations were performed by two experienced ophthalmologists using binocular indirect ophthalmoscopy with scleral indentation after pharmacological pupil dilation. Screening was initiated at 4–6 weeks of chronological age or at 31–33 weeks of postmenstrual age, whichever occurred later. Follow-up examinations were scheduled at intervals determined by disease severity and continued until either full retinal vascularization was achieved or the treatment criteria were met. For each infant, the total number of ophthalmological examinations completed prior to the survey date was recorded from the medical charts and later included as a covariate in the statistical analyses.

Timing of Questionnaire Administration

The mothers completed the questionnaires on the same day as their infants' scheduled ROP examinations within the study period. In the ROP-treated group, this typically occurred during routine post-treatment follow-up. For the ROP–no treatment group, screening was ongoing. For the no-ROP group, questionnaires were administered at a scheduled screening visit at which infants were confirmed to have no signs of ROP or, in some cases, to have mature retinal vasculature. This same-day administration minimized recall bias by capturing maternal psychological responses directly related to clinical encounters.

The data collection tools used in this study were as follows:

1. Sociodemographic Information Form: Designed by the researchers, this form gathered essential background information, such as maternal age, education level, socioeconomic status, and family structure.

2. State-Trait Anxiety Inventory (STAI): Developed by Spielberger (17) and adapted into Turkish by Öner and Le Compte (18) in 1985, this inventory measures anxiety on two dimensions: State Anxiety (STAI-S), which evaluates temporary anxiety triggered by specific situations (e.g., the stress of a medical diagnosis), and Trait Anxiety (STAI-T), which reflects a general tendency toward anxiety. Each subscale contains 20 items; subscale scores range from 20 to 80, with higher scores indicating greater anxiety.

3. The Intolerance of Uncertainty Scale-12 (IUS-12) is a 12-item scale that assesses the tendency to perceive uncertain or unpredictable situations as distressing. Responses are rated on a 5-point Likert scale, with total scores ranging from 12–60. High scores indicate low tolerance for uncertainty, which is a common challenge for mothers coping with their infants' unpredictable medical outcomes.

4. Perceived Maternal Parenting Self-Efficacy Scale (PMPS-E), developed by Barnes and Adamson-Macedo (19) and validated in Turkish by Kahya and Uluc (20) measures a mother's confidence in her ability to effectively fulfill parenting roles, particularly in the context of preterm infant care. The scores ranged from 20 to 80, with higher scores reflecting greater self-efficacy and confidence.

5. Edinburgh Postnatal Depression Scale (EPDS): A 10-item screening tool created by Cox et al. (21) and validated

in Turkish by Engindeniz et al. (22). It is used to screen for depressive symptoms during the postnatal period, with higher scores indicating greater severity .

6. Ruminative Response Scale–Short Form: The NRS and positive rumination (PRS) subscales were used to assess maladaptive and adaptive ruminative thinking styles. Higher scores indicate greater engagement in the rumination style.

7. The Connor-Davidson Resilience Scale (CD-RISC), a 25-item measure that evaluates psychological resilience (defined as the ability to cope effectively with stress and adversity), was used. The scores were rated on a 5-point Likert scale, with higher scores indicating greater resilience. The validity and reliability of the Turkish version of the scale were established by Karaırmak (2010) (23). Resilience is crucial for mothers in managing the emotional challenges posed by the medical needs of their infants.

Statistical Analysis

Analyses were performed using SPSS version 29.0 (IBM Corp., Armonk, NY, USA). Categorical variables are presented as frequencies and percentages, whereas continuous variables are expressed as means with standard deviations or medians with interquartile ranges, as appropriate. Normality was assessed using the Kolmogorov–Smirnov test, skewness and kurtosis values, and visual inspection of box plots and histograms. Depending on the distribution of the data, comparisons between two groups were conducted using the Student's t-test or the Mann–Whitney U test, while comparisons across three groups were performed using one-way ANOVA or the Kruskal–Wallis H test; Bonferroni correction was applied for multiple comparisons. Associations between categorical variables were examined using the chi-square test, and correlations among numerical variables were assessed using Spearman's rank correlation coefficients. To control for potential confounding factors, a multivariate analysis of covariance (MANCOVA) was conducted with maternal education level and the number of ophthalmologic examinations as covariates. The dependent variables in the MANCOVA model were psychological scale scores (STAI-S, STAI-T, EPDS, NRS, PRS, IUS-12, CD-RISC, and PMPS-E). Pillai's Trace was used as the multivariate test statistic, and significant multivariate effects were followed by univariate analysis of covariances with post-hoc pairwise comparisons. A two-tailed p-value of <0.05 was considered statistically significant.

Results

A total of 267 infants were included in the study, of whom 140 were diagnosed with ROP (ROP [+]) and 127 were without ROP (no ROP). In the ROP [+] group, 47 infants were classified as having type 1 or aggressive ROP and received anti-VEGF injections, laser ablation, or combination therapy. Infants in the ROP [+] group had significantly lower gestational age (28.84 ± 2.93 vs. 31.72 ± 1.56 weeks; $p < 0.001$), lower birth weight, and longer hospital stays (63.01 ± 31.24 vs. 25.92 ± 15.33 days; $p < 0.001$). While most sociodemographic variables showed no significant differences between the groups, maternal education was higher in the No ROP group ($p = 0.008$). Demographic characteristics are summarized in Table 1.

When psychological scale scores were compared across the three groups, state anxiety (STAI-S) and trait anxiety (STAI-T) were highest in the ROP–No Treatment group compared with both the ROP–treated and No ROP groups ($p < 0.001$). Mothers in the ROP–treated group demonstrated significantly higher psychological resilience (CD-RISC) scores than mothers in the ROP–no treatment group ($p = 0.044$). For NRS, both the ROP (no treatment) and ROP (treated) groups scored significantly higher than the No ROP group ($p = 0.008$). No significant group differences were observed in depressive symptoms (EPDS), PRS, intolerance of uncertainty (IUS-12), or parenting self-efficacy (PMPS-E) in the unadjusted analysis (Table 2).

The distribution of ophthalmologic examination numbers differed significantly across groups, with the highest frequency observed in the ROP–treated group, followed by the ROP–no treatment group, and the lowest frequency in the no ROP group ($p < 0.001$), as illustrated in Figure 1.

Correlation analyses showed that STAI-S correlated positively with STAI-T ($r = 0.53$, $p < 0.001$) and with EPDS scores ($r = 0.46$, $p < 0.001$), whereas resilience (CD-RISC) correlated negatively with both anxiety and depression ($p < 0.001$). NRS correlated positively with STAI-T and EPDS scores, whereas PRS correlated positively with resilience and negatively with depression (Table 3). These findings highlight the strong interrelationships between maternal anxiety, depression, resilience, and cognitive processing.

To account for confounders, a MANCOVA was performed, controlling for maternal education and the number of ophthalmological examinations. After adjustment, significant group differences persisted for state anxiety ($p < 0.001$), trait anxiety ($p = 0.001$), and parenting self-efficacy ($p = 0.006$). Specifically, both the ROP–No Treatment and ROP–treated groups had higher STAI-S scores than the No ROP group, whereas trait anxiety remained highest in the ROP–No Treatment group. Importantly, parenting self-efficacy scores, which did not differ significantly in unadjusted analyses, were significantly higher in both ROP groups after adjustment for confounders.

Table 1. Demographic characteristics.

	ROP (+)*, (n = 140)	ROP (–), (n = 127)	p-value
Age of infant (days), mean ± SD	160.9 ± 144.3	69.8 ± 52.4	<0.001
Gender of the infant, n (%) Girls Boys	 66 (47.1%) 74 (52.9%)	 61 (48.0%) 66 (52.0%)	0.885
Gestational age of the infant (weeks), mean ± SD	28.84 ± 2.93	31.72 ± 1.56	<0.001
Birth weight of the infant (g), mean ± SD	1228.5 ± 502.3	1839.7 ± 495.7	<0.001
The length of hospitalization (days), mean ± SD	63.01 ± 31.24	25.92 ± 15.33	<0.001
Socioeconomic status, n (%) Low Middle High	 21 (15.0%) 106 (75.7%) 13 (9.3%)	 14 (11.0%) 109 (85.8%) 4 (3.2%)	0.062
Maternal age (years), mean ± SD	26.41 ± 7.30	26.44 ± 7.88	0.272
Maternal education, n (%) High school or below University	 77 (55.0%) 63 (45.0%)	 89 (70.1%) 38 (29.9%)	0.008
Maternal job status, n (%) Working Not working	 36 (25.7%) 104 (74.3%)	 37 (29.1%) 90 (70.9%)	0.531
Family type, n (%) Nuclear Large Single	 117 (83.6%) 19 (13.6%) 4 (2.8%)	 93 (73.3%) 29 (22.8%) 5 (3.9%)	0.116
Birth type, n (%) Cesarean Vaginal	 133 (95.0%) 7 (5.0%)	 111 (87.4%) 16 (12.6%)	0.027

*ROP (+) group includes both treated and untreated cases. ROP, retinopathy of prematurity; SD, standard deviation.

Table 2. Comparing the groups based on their scale scores.

	ROP (+)		ROP (–)	p-value*
	ROP–no treatment	ROP–treated	No ROP	
STAI–S score	36.03 ± 8.28 (37.0)[b]	32.15 ± 5.86 (30.0)[a]	31.58 ± 7.75 (31.0)[a]	<0.001
STAI–T score	41.32 ± 8.58 (42.0)[b]	35.81 ± 5.34 (34.0)[a]	37.41 ± 9.52 (36.0)[a]	<0.001
EPDS score	6.68 ± 5.57 (5.0)	5.87 ± 4.39 (4.0)	5.63 ± 5.06 (5.0)	0.328
NRS score	20.49 ± 4.62 (20.0)[a,b]	20.87 ± 2.14 (21.0)[a]	19.61 ± 3.03 (19.0)[b]	0.008
PRS score	26.42 ± 5.00 (26.0)	28.11 ± 4.77 (28.0)	27.02 ± 4.82 (27.0)	0.146
IUS-12_total	30.28 ± 9.21 (29.0)	28.79 ± 9.01 (29.0)	29.72 ± 11.65 (27.0)	0.591
PMPS-E	57.32 ± 8.647 (57.0)	58.11 ± 8.69 (61.0)	55.18 ± 8.10 (55.0)	0.159
CD-RISC_total	94.68 ± 12.50 (97.0)[b]	100.21 ± 10.51 (103.0)[a]	97.85 ± 17.57 (99.0)[a,b]	0.044

Mean ± SD (median), *Kruskal–Wallis H test. Superscript letters [a, b] indicate post-hoc pairwise comparisons between groups: values sharing the same letter do not differ significantly, whereas values with different letters indicate statistically significant differences. Significance values have been adjusted by the Bonferroni correction for multiple tests. CD-RISC_total, Connor-Davidson Resilience Scale – total score; EPDS, Edinburgh Postnatal Depression Scale; IUS-12_total, Intolerance of Uncertainty Scale – 12 items, total score; NRS, Numeric Rating Scale; PMPS-E, Parents' Postoperative Pain Measure – Extended; PRS, Pain Relief Scale; ROP, retinopathy of prematurity; SD, standard deviation; STAI–S, State-Trait Anxiety Inventory – State; STAI–T, State-Trait Anxiety Inventory – Trait.

Discussion

This study examined the psychological impact of the diagnosis and treatment of ROP on mothers of preterm infants. Three main findings emerged. First, mothers in the ROP–no treatment and ROP–Treated groups exhibited significantly higher levels of state anxiety and NRS than mothers in the no ROP group, indicating that the ROP diagnostic process itself

is a substantial source of situational psychological distress. Second, the highest anxiety levels were observed among mothers in the ROP—no treatment group, whereas mothers in the ROP—treated group demonstrated significantly greater psychological resilience. Third, psychological resilience was negatively associated with anxiety, depressive symptoms, and NRS, suggesting a potential protective role of maternal psychological adjustment during the ROP care process. Taken together, these findings indicate that the psychological burden experienced by mothers of infants with ROP is shaped not only by disease severity but also by treatment status and by the structure and intensity of medical follow-up and support services.

The elevated levels of state anxiety observed among mothers of infants diagnosed with ROP are consistent with previous studies emphasizing the psychological burden associated with uncertainty and prolonged medical monitoring in the care of preterm infants (4–6). The absence of significant differences in trait anxiety across groups suggests that the heightened anxiety observed in these mothers reflects a situational response to stressors specific to the ROP diagnosis and care process, rather than stable personality characteristics. Although the literature examining mothers of infants with ROP remains limited, existing studies generally report increased maternal anxiety with greater ROP severity (5–7). Notably, the highest anxiety levels were observed among mothers in the ROP No Treatment group. This finding suggests that more frequent medical examinations and more structured follow-ups in the ROP-treated group may have mitigated uncertainty and alleviated psychological distress.

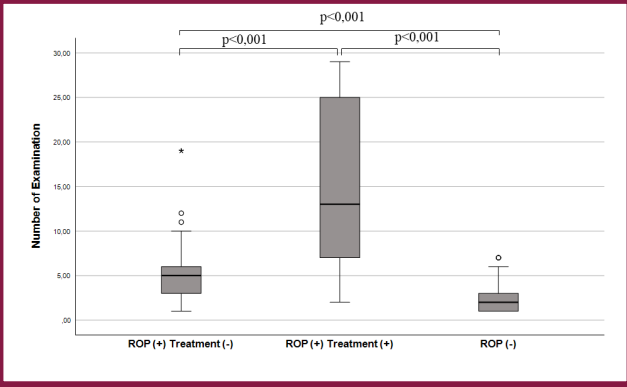

Figure 1. Comparison of examination numbers among infants with ROP requiring treatment, not requiring treatment, and without ROP. *ROP (+) includes both treated and untreated cases. ROP, retinopathy of prematurity; SD: standard deviation.

A systematic review of interventions aimed at reducing parenting stress in families of children with pediatric conditions highlighted that consistent and structured communication with healthcare professionals alleviates parental uncertainty and stress by providing clear, regular updates about the child's condition and care (24). Similarly, in our study, mothers in the ROP-treated group engaged more frequently with healthcare providers and received more detailed information about their infants' status. This may have contributed to reduced anxiety and facilitated better psychological adaptation to treatment. Furthermore, routine follow-ups and structured care plans appear to enhance mothers' sense of control, thereby supporting lower anxiety levels (25,26).

The study's findings indicate that mothers in the ROP–treated group, who faced more severe challenges related to ROP, demonstrated higher psychological resilience than mothers in the ROP–no treatment group, as reflected in their CD-RISC scores. Resilience is a protective mechanism that facilitates adaptation to complex caregiving demands,

Table 3. Correlations among study variables.

	STAI–S	STAI–T	EPDS	NRS	PRS	IUS-12_total	PMPS-E	CD-RISC_total
STAI–S	–							
STAI–T	0.530***	–						
EPDS	0.464***	0.627***	–					
NRS	0.046	0.319***	0.237***	–				
PRS	−0.275***	−0.290***	−0.332***	0.069	–			
IUS-12_total	0.189**	0.482***	0.403***	0.160**	−0.223***	–		
PMPS-E	0.170**	0.085	0.071	0.025	−0.137*	0.087	–	
CD-RISC_total	−0.349***	−0.312***	−0.207***	−0.062	0.261***	−0.141*	0.080	–

Spearman correlation analysis, *p < 0.05, **p < 0.01, ***p < 0.001. All correlations are based on the total sample (n = 267). CD-RISC_total, Connor-Davidson Resilience Scale – total score; EPDS, Edinburgh Postnatal Depression Scale; IUS-12_total, Intolerance of Uncertainty Scale – 12 items, total score; NRS, Numeric Rating Scale; PMPS-E, Parents' Postoperative Pain Measure – Extended; PRS, Pain Relief Scale; ROP, retinopathy of prematurity; SD, standard deviation; STAI–S, State-Trait Anxiety Inventory – State; STAI–T, State-Trait Anxiety Inventory – Trait.

promotes positive coping strategies, and mitigates maladaptive patterns of thought (14).

Previous studies have not explicitly examined the relationship between ROP-related challenges and resilience. However, these findings differ from those reported by Xie et al. (7), who identified lower resilience levels among the parents of infants with severe ROP. Such discrepancies may stem from contextual differences, including cultural factors, healthcare systems, and participant characteristics (27). For instance, a study conducted in China found that low levels of social support and high stress during outpatient fundus examinations were associated with reduced resilience (7). In contrast, a study in Türkiye observed that low-income mothers were better able to cope with uncertainty owing to the support provided by the healthcare system and extended family networks (28). These findings suggest that regular and structured information flow from healthcare professionals is crucial to helping mothers manage uncertainty and strengthen their psychological resilience (29).

The NRS was significantly associated with higher anxiety and depression scores, highlighting its role as a mediator of emotional distress. This finding underscores the importance of addressing maladaptive cognitive processes in interventions aimed at improving mental health. However, the lack of significant differences in EPDS scores between the groups suggests that depression may not vary substantially across diagnostic categories, it remains a critical underlying concern. This contrasts with the findings of Duman et al. (5). Özyurt et al. (6) reported higher EPDS scores in mothers of infants with ROP. The absence of differences in our study may indicate that depression is a widespread issue among mothers, independent of ROP severity or treatment.

While unadjusted analyses showed no significant group differences in PMPS-E and IUS-12, adjusted analyses revealed that self-efficacy scores were significantly higher in both ROP groups than in the No ROP group. This suggests that maternal education and examination frequency may partially mask between-group differences in self-efficacy. Nevertheless, the relatively low levels of self-efficacy observed in the sample highlight the need for targeted interventions to strengthen maternal caregiving confidence, particularly through educational and structured support programs (6).

This study highlights the need for psychological interventions for mothers of preterm infants with ROP. Programs that build resilience, such as mindfulness-based and cognitive-behavioral techniques, may help mothers cope more effectively with caregiving challenges. Addressing negative thought patterns and promoting adaptive cognitive strategies can reduce emotional distress, while parent support groups and educational initiatives may foster a sense of community and shared understanding among affected families.

Study Limitations

This study had several limitations. First, the cross-sectional design prevented causal inferences regarding the relationships between the psychological constructs. Longitudinal studies are required to clarify how maternal mental health evolves over time and in response to various interventions. Second, the exclusion of fathers limits the generalizability of the findings, as paternal experiences may differ and require further investigation. Third, although maternal education and the number of ophthalmological examinations were statistically controlled, other unmeasured confounders (e.g., social support, parity, and socioeconomic factors) may also affect maternal psychological outcomes. Additionally, variations in examination frequency may have contributed to differences in anxiety and resilience, underscoring the need for standardized follow-up protocols in future research. Finally, future studies should consider the broader role of cultural factors and healthcare system characteristics in shaping maternal responses to the ROP.

Conclusion

This study demonstrated a complex interplay among anxiety, resilience, and cognitive processing in mothers of preterm infants with ROP. By identifying key psychological challenges and protective factors, this study provides a foundation for developing targeted interventions to support mothers' mental health. Addressing the unique needs of this vulnerable population is essential not only for improving maternal well-being, but also for optimizing infant health outcomes.

Ethics

Ethics Committee Approval: Ethics committee approval was obtained from the University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital, Institutional Clinical Research Ethics Committee prior to study initiation (decision number: KAEK-11/25.09.2024.167, dated: 06.11.2024).

Informed Consent: Before participation, written informed consent was obtained from all participants.

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Footnotes

Authorship Contributions

Concept: D.K.E., C.G., Design: D.K.E., C.G., Data Collection or Processing: C.G., Analysis or Interpretation: D.K.E., C.G., Literature Search: D.K.E., Writing: D.K.E.

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