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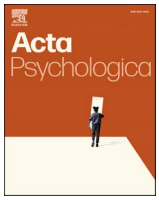

Anxiety levels and associated sociodemographic factors in mothers of children with first febrile seizures: A case-control study

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ABSTRACT

Objective: The prognosis of febrile seizures (FS) is generally favorable; however, a child's first febrile seizure can be distressing for parents. The aim of this study was to assess the anxiety levels of mothers whose children present to the pediatric emergency department with FS for the first time and to examine the relationship between these anxiety levels and the sociodemographic characteristics of the mothers.

Methods: This case-control study included mothers presenting for the first time to the pediatric emergency department of our hospital with children aged 6 months to 6 years, either for simple FS or for fever without seizures. Maternal anxiety levels were assessed using the State–Trait Anxiety Inventory (STAI) approximately 12 h after the initial seizure. Sociodemographic characteristics were also collected, and the relationship between these characteristics and anxiety levels was analyzed.

Results: A total of 103 participants (52 in the FS group, 51 controls) were included. Higher maternal education and family income were associated with lower STAI-S and STAI-T scores. The FS group had significantly higher mean STAI-S ($p < 0.001$) and STAI-T ($p = 0.007$) scores, by 14.6 and 3.6 points, respectively. Multivariate analyses revealed that income was a significant confounder for both STAI-T and STAI-S.

Conclusion: Mothers of children with FS report higher levels of anxiety. Sociodemographic factors, such as income and maternal education level, play a significant role in maternal anxiety levels. Targeted educational and support programs addressing income inequalities in healthcare could help reduce maternal anxiety and improve the management of FS.

1. Introduction

Febrile seizures (FS) is a neurological emergency that usually occurs in children between 6 months and 5 years of age without any underlying disease and accounts for 1% of all emergency department visits (Bergamo et al., 2015). Although it occurs in 2–5% of children aged 6 months to 5 years, it is most commonly seen at 18 months (Kimia et al., 2015). Two separate studies conducted in our country found that the frequency of FS ranged from 2.5 to 4.8 (Ateşoğlu et al., 2018; Carman., 2014). About one-third of children experiencing their initial FS will encounter a subsequent seizure, whereas their siblings face a 20% risk of seizures (Berg et al., 1997; Saghazadeh et al., 2014). Research indicates that no brain damage occurs following FS, and the associated risk of death and morbidity is minimal (Berg et al., 1997).

The prognosis following FS is typically favorable; however, the occurrence of a seizure within the family can be distressing for parents (Fetveit, 2008; Westin & Sund Levander, 2018; Wirrell & Turner, 2001). Several studies indicate that parents believe their child may die during an episode of FS (Kanemura et al., 2013; Kolahi & Tahmooreszadeh, 2009). Some parents who believe their child will suffer brain damage as

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a result of FS may experience extreme anxiety and panic (Kanemura et al., 2013). Furthermore, the quality of family life may be reduced in the following period, and families may experience prolonged anxiety when their child has a fever (Flury et al., 2001). It has been reported that families in this situation administer fever-reducing medications more frequently or in higher doses (Walsh et al., 2009). According to research, a lack of understanding about FS is linked to severe anxiety (Flury et al., 2001; Westin & Sund Levander, 2018). In a study conducted in our country, parents' attitudes toward fever and FS were influenced by factors such as family education level and financial status (Yilmaz et al., 2008).

Previous research has largely focused on parental knowledge or general emotional reactions to FS, with limited attention to the role of socioeconomic factors in shaping anxiety. In addition, evidence from our country is scarce, and controlled comparisons with mothers of febrile but non-seizing children are uncommon. By incorporating socioeconomic variables within a case–control design, the present study addresses these gaps and offers a clearer understanding of the specific factors influencing maternal anxiety after a child's first FS. Therefore, our study aims to determine the anxiety levels of mothers whose children present to the pediatric emergency department with FS for the first time and to examine the relationship between their anxiety levels and sociodemographic characteristics.

2. Literature review

2.1. Psychological burden of a first febrile seizure on mothers

Although FS are relatively common in childhood, a first FS episode is often appraised by parents as a highly threatening event, and catastrophic interpretations during and after the episode (e.g., fear of death or permanent harm) are frequently reported (Flury et al., 2001). This initial experience has been associated particularly in mothers with a marked increase in acute anxiety as well as functional disruptions in family life (e.g., fragmented sleep, increased nocturnal monitoring of the child, and worry about missing a subsequent seizure) (Wirrell & Turner, 2001). Moreover, maternal anxiety levels appear to be closely linked to uncertainty, with uncertainty identified as a strong predictor of mothers' state anxiety (Ju et al., 2011). Taken together, these findings suggest that, despite the generally benign medical course of a first FS, the event may be experienced from the parental perspective as carrying a substantial psychological burden and a pronounced sense of threat (Østergaard, 2009).

2.2. Cognitive determinants of anxiety: Uncertainty and knowledge/misperceptions

One of the most salient cognitive correlates of FS action-oriented related anxiety in mothers is uncertainty. In a study conducted with mothers of children hospitalized for FS, uncertainty emerged as the strongest predictor of maternal state anxiety; maternal income, seizure frequency, and FS-related knowledge were also significantly associated with anxiety (Ju et al., 2011). With respect to the knowledge domain, the literature suggests that merely knowing that FS are "generally benign" does not necessarily translate into reduced anxiety. Although lack of prior knowledge about FS has been linked to more severe anxiety, elevated anxiety may persist even among some parents who report being informed; therefore, education should extend beyond general reassurance and be structured in a specific, action-oriented manner (e.g., clear guidance on what to do and what not to do during a seizure) (Flury et al., 2001). Consistent with this view, studies focusing on parents' thoughts and behaviors during and after seizures indicate that catastrophic automatic thoughts such as fears that the event will "turn into epilepsy" or "cause permanent brain damage" are common and may heighten panic, thereby precipitating inappropriate responses (Kanemura et al., 2013).

2.3. Sociodemographic factors: Education, income, and health literacy

Although the association between sociodemographic characteristics and maternal anxiety does not follow a single, universal pattern across the literature, available findings can be interpreted coherently through several plausible mediating pathways. Higher educational attainment appears to be associated with greater health literacy and a more accurate knowledge practice repertoire regarding FS/fever management; in turn, this may indirectly attenuate anxiety by reducing perceived uncertainty and the experience of loss of control during acute episodes. Consistent with this account, lower education has been reported to be associated with more severe anxiety (Flury et al., 2001), and higher maternal education has been linked to more appropriate fever management behaviors such as thermometer use and accurate identification of fever (Erkek et al., 2010). Income level/socioeconomic status may also influence anxiety through mechanisms such as access to healthcare, availability of caregiving resources, and overall stress burden, and studies have reported an association between maternal income and anxiety (Ju et al., 2011). Nevertheless, evidence also suggests that in the immediate aftermath of a first FS episode, the explanatory power of socioeconomic indicators may diminish (Wirrell & Turner, 2001), which is consistent with the notion that a highly threatening acute event may transiently reduce between-group differences in anxiety levels. In addition, sociodemographic characteristics may be related to parents' competence in FS first aid and home management; limited knowledge of appropriate first aid steps and maladaptive practices may maintain uncertainty and perceived loss of control, thereby sustaining anxiety. Accordingly, some studies indicate that parents' knowledge and practices regarding FS first aid and home management may vary with sociodemographic indicators, and that many parents are insufficiently familiar with appropriate first aid procedures (Huang et al., 2002; Kanemura et al., 2013; Paul et al., 2007). Taken together, the literature suggests that sociodemographic factors may shape anxiety less through direct effects than through intermediate cognitive cross-sectional processes such as knowledge practice competence, uncertainty, and perceived control.

2.4. Interventions: Education and psychosocial support

Evidence suggests that approaches extending beyond single-session/standard information provision specifically, those incorporating components aimed at reducing uncertainty, delivering actionable first-aid training, and providing psychosocial support may be more effective. Several studies have reported that educational/psychoeducational interventions improve parents' FS-related knowledge and attitudes and may contribute to reductions in anxiety (El-esrigy et al., 2021; Kızılay et al., 2017; S Said & A El-Maghawry, 2020). In addition, interventions integrating targeted emergency care with psychological care have been associated with decreases in parental anxiety and depressive symptoms (Han et al., 2024). From a broader perspective, review work addressing the "non-clinical burden" of FS also highlights the high prevalence of parental anxiety and underscores the importance of educational interventions (Marangoni et al., 2024).

2.5. Gaps in the literature and study rationale

The existing literature indicates that anxiety increases in parents particularly mothers following a first FS; however, the generalizability of findings and their comparability across studies remain insufficiently clear due to several methodological limitations. The substantial reliance on cross-sectional designs hampers robust examination of the acute trajectory of anxiety and of how its determinants may evolve over time (Ju et al., 2011; Wirrell & Turner, 2001). In addition, outcomes are frequently reported at the "parent" level; given that caregiving responsibilities in many contexts are disproportionately assumed by mothers, this practice constrains efforts to disentangle mother-specific

cognitive-emotional processes and sociodemographic vulnerabilities (Ju et al., 2011; Wirrell & Turner, 2001). Further, heterogeneity in the operationalization and measurement of sociodemographic variables (e.g., education, income, social resources) complicates synthesis of the direction and magnitude of observed associations (Ju et al., 2011; Wirrell & Turner, 2001). Evidence regarding the role of "information" in reducing anxiety is also mixed, suggesting that the content, specificity, and practical applicability of education particularly whether it provides actionable guidance on what to do and what not to do during a seizure may meaningfully shape outcomes (Flury et al., 2001).

Against this background, a case control design comparing mothers of children who experienced a first FS with mothers of febrile children who presented for illness but did not have seizures offers a methodologically appropriate framework. Such a comparison can partially account for shared contextual stressors related to fever and hospital presentation, more clearly isolate the psychological burden attributable to the seizure experience itself and yield a more discriminable profile of sociodemographic patterns associated with maternal anxiety.

3. Materials and methods

3.1. Study design and participants

This study was designed as a case-control investigation conducted at the pediatric emergency department of Kartal Dr. Lütfi Kırdar City Hospital, Istanbul, Türkiye between October 1, 2022, and March 1, 2023. The study included mothers of children aged 6 months to 6 years who presented for the first time to the hospital due to either simple FS or fever without seizures. Families whose children were diagnosed with meningitis or encephalitis following the seizure, whose children had developmental motor delay or chronic disease (cardiovascular dysfunction, neurological disorder, malignancy), who had a psychiatric disease, were taking psychiatric medication, or refused to participate in the study were all excluded. The control group consisted of mothers of children aged 6 to 72 months who presented to the pediatric emergency department during the same study period with fever but without seizures. These children had no history of FS, epilepsy, or developmental delay, and were considered developmentally healthy. The control group was selected from the same clinical setting to ensure comparable healthcare access, environmental exposure, and stress context. Group-level matching was performed rather than individual matching. Controls were broadly comparable to the FS group in terms of age, gender distribution, and socio-cultural level. Socio-cultural level was operationally defined using factors such as residential environment, maternal education level, and average monthly household income. Group-level matching was chosen to enable efficient recruitment in a high-volume emergency department while preserving comparability between groups. To confirm that no systematic differences existed between the FS and control groups, key demographic and socioeconomic variables were statistically compared using appropriate tests. Our study was approved by the Kartal Dr. Lütfi Kırdar City Hospital Ethics Committee on date 28.09.2022 and decision number 2022/5 l4/234/28, following the Declaration of Helsinki guidelines. After obtaining written informed consent from the mothers, information regarding age, education level, occupation, average monthly income, and history of psychiatric illness was collected, and the State-Trait Anxiety Inventory (STAI) was administered. All interviews were conducted by a member of the study team approximately 12 h after the child's admission to the pediatric emergency department.

3.2. Spielberger state- trait anxiety inventory

The mother's anxiety levels were assessed using the STAI. The scale was created by Spielberger et al. (Spielberger, 1983) and adopted to Turkish by Öner (Oner, 1983). The STAI consists of two subscales, each with 20 items, that assess an individual's state and trait anxiety levels. The State Anxiety Inventory (STAI-S) measures an individual's anxiety at a specific time and under specific conditions, whereas the Trait Anxiety Inventory (STAI-T) measures an individual's overall tendency to anxiety. The scale has a range of 20 to 80 points, with higher scores indicating higher levels of anxiety.

3.3. Ethics

Our study was approved by the Kartal Dr. Lütfi Kırdar City Hospital Ethics Committee (approval date: 28.09.2022; decision number: 2022/514/234/28) following the Declaration of Helsinki guidelines.

3.4. Sample size

We estimated we would need a minimum of 98 patients to build a linear regression model (f2:0.15, alpha error:0.05, and beta error 0.80) with six predictors. We picked 52 individuals for the patient and the control groups.

3.5. Statistical analysis

Data are presented as mean ± standard deviation, median (interquartile range), or n (%). The Kolmogorov–Smirnov test, skewness and kurtosis values, and Q–Q plots were used to assess distributional assumptions. Linear regression analyses were performed when the assumptions of normality, homoscedasticity, independence, and absence of multicollinearity were met; otherwise, a generalized linear model was applied. Thus, both modeling approaches were used depending on assumption fulfillment: linear regression for outcomes meeting standard assumptions and generalized linear models when these assumptions were violated. This dual strategy ensured the most appropriate analytic approach for each outcome and improved the robustness of the multivariate analyses. We used a backward elimination method to assess confounders and also presented R2 of the multivariate analysis which gives the power of correlations. The statistical calculations were performed with the JAMOVI 2.3.18 statistical package program.

4. Results

We included 103 individuals (52 for the FS group and 51 for controls) in this study. The descriptive status of the participants is presented in Table 1.

We assessed the correlations between the children's gender, children's age, mothers age, family income, and educational and working status of the mother and the STAI-S and STAI-T results. Overall, mothers of children with FS showed higher anxiety scores than controls across both state and trait measures. STAI-S and STAI-T scores decreased with higher maternal education and higher family income. (Table 2). Mean STAI-S ($p < 0.001$) and STAI-T ($p = 0.007$) were higher in the FS group by 14.6 and 3.6 points, respectively. Mothers' ages were also higher in

Table 1
Sociodemographic Characteristics of the Participants.

Variable	Control Group (n = 51)	Febrile Seizures Group (n = 52)
Child's Gender (Female)	45.1% (n = 23)	34.6% (n = 18)
Mother's Age (years)	30.7 ± 3.9	34.5 ± 5.3
Child's Age (months)	27.0 (13.5–51.5)	26.5 (14.8–48.5)
Mother's Working Status	37.3% (n = 19)	50.0% (n = 26)
Maternal Education (≥ University)	64.7% (n = 33)	55.8% (n = 29)
Monthly Family Income		
< 500 USD	29.4% (n = 15)	19.2% (n = 10)
500–1000 USD	11.8% (n = 6)	57.7% (n = 30)
> 1000 USD	58.8% (n = 30)	23.1% (n = 12)

Data is presented as mean+/-SD, median (IQR), and n(%).

Table 2
Correlations Between STAI Scores and Sociodemographic Variables in the Whole Sample and the Febrile Seizure Subgroup.

	Whole Group		Febrile Seizures Group	
	STAI-S	STAI-T	STAI-S	STAI-T
Children's' gender	0.065 K	0.010 K	0.023 K	0.127 K
Mother's age p	0.154 K	−0.040 K	−0.163 K	−0.237 K
Children's age s	0.082 P	0.098 P	0.223 P	0.052 P
Working status	0.085 S	−0.027 S	0.148 S	0.202 S
Educational status	−0.165 K *	−0.105 K	−0.396 K ***	−0.284 K *
Family income	−0.225 K **	−0.230 K **	−0.515 K ***	−0.458 K ***

Correlations were calculated separately for the whole sample and the febrile seizure subgroup. No between-group comparisons were performed.
K: Kendall's test, P: Pearson's test, S: Spearman's test.
*: $p < 0.05$
**: $p < 0.01$
***: $p < 0.001$.

the FS group ($p < 0.001$) by 3.8 years. Therefore, these variables were included in multivariate models to identify relevant covariates.

In the linear regression model, income emerged as the primary factor associated with STAI-T. Linear regression was used to predict STAI-T scores after adjusting for potential confounders. Non-significant variables were removed via backward elimination, leaving income and FS status in the model. The analysis showed that the mean STAI-T score was 4.0 points lower (95% CI: 0.7–7.3) in the >1000 USD/month group compared to the <500 USD/month group ($p = 0.018$), and 3.3 points lower (95% CI: −0.1–6.6) in the 500–1000 USD/month group ($p = 0.055$, indicating a trend-level but non-significant association). The STAI-T score was 2.5 points higher (95% CI: −0.4-5.4) in the FS group compared to the control group ($p = 0.09$) and FS status therefore remained a relevant covariate rather than a statistically significant predictor. (Linear regression, $R^2 = 0.130$). No significant difference was found between the 500–1000 USD/month and < 500 USD/month groups ($p = 0.691$) (Fig. 1).

A similar approach was used to predict STAI-S scores, again adjusting for the same confounders. After backward elimination, income, maternal age, and FS status remained in the model as relevant covariates. The analysis indicated that each one-year increase in maternal age was associated with a 0.3-point decrease in STAI-S score (95% CI: 0–0.6, $p = 0.098$), indicating a non-significant trend-level association. The mean STAI-S score was 3.8 points higher (95% CI: −0.1-7.6) in the <500 USD/month group compared to the 500–1000 USD/month group ($p = 0.053$, trend-level, not statistically significant), and 3.5 points higher (95% CI: 0–7.1) compared to the >1000 USD/month group ($p = 0.052$, also trend-level). The STAI-S score was 16.0 points higher (95% CI: 12.6–19.4) in the FS group compared to the control group ($p < 0.001$) (Linear regression, $R^2 = 0.552$). No significant difference was found between the 500–1000 USD/month and > 1000 USD/month groups ($p = 0.879$). The estimated marginal means are presented in Table 3, with the corresponding graph in Fig. 1.

The generalized linear model further confirmed the central role of income in predicting STAI-T. Income remained the main covariate in the generalized linear model analysis. The multivariate analysis showed that the mean STAI-T score was 4.2 points lower (95% CI: 0.1–8.2) in the group earning 500–1000 USD/month compared to those earning less than 500 USD/month ($p = 0.045$), and 8.0 points higher (95% CI: 4.2–11.8) in the group earning more than 1000 USD/month ($p < 0.001$). The model demonstrated a goodness-of-fit with $R^2 = 0.369$ (Fig. 2).

Similarly, income remained a significant predictor of STAI-S in the generalized linear model analysis. In the multivariate analysis, the mean

Table 3
Groupwise Estimated Marginal Means of Maternal STAI-S According to Age and Income.

Group	Family income (per month)	Mother's Age	Estimated mean STAI-S score (95%CI)
Control	**<500 USD**	27.6	35.9 (32.8–39.0)
		32.6	34.7 (31.5–37.8)
		37.6	33.4 (29.6–37.2)
	500–1000 USD	27.6	32.1 (28.6–35.7)
		32.6	30.9 (27.3–34.4)
		37.6	29.6 (25.5–33.7)
	>1000 USD	27.6	32.4 (29.8–35.0)
		32.6	31.1 (28.8–33.5)
		37.6	29.9 (26.9–32.9)
Febrile Seizure	**<500 USD**	27.6	51.9 (48.1–55.7)
		32.6	50.6 (47.3–54.0)
		37.6	49.4 (45.9–52.9)
	500–1000 USD	27.6	48.1 (45.0–51.2)
		32.6	46.9 (44.4–49.3)
		37.6	45.6 (43.0–48.2)
	>1000 USD	27.6	48.4 (44.5–52.3)
		32.6	47.1 (43.9–50.3)
		37.6	45.9 (42.7–49.0)

Estimated marginal means of maternal state anxiety scores (STAI-S) are presented according to febrile seizure group status, maternal age, and monthly income. Values were calculated using a generalized linear model adjusting for potential confounders.

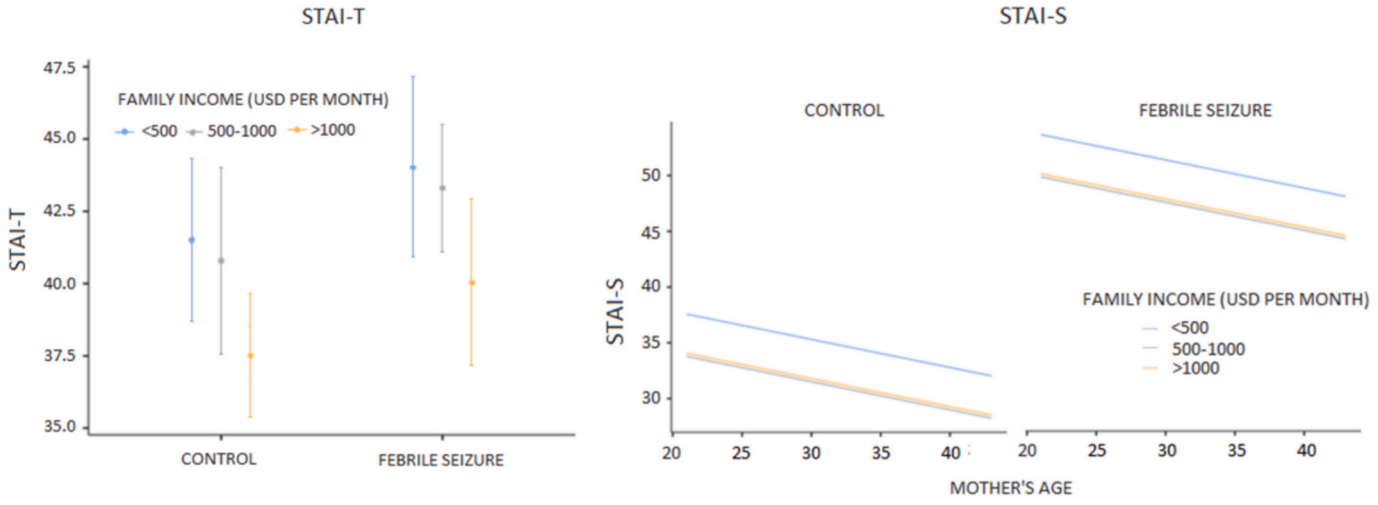

Fig. 1. STAI-T and STAI-S correlations with the mother's age, family income and febrile seizures.

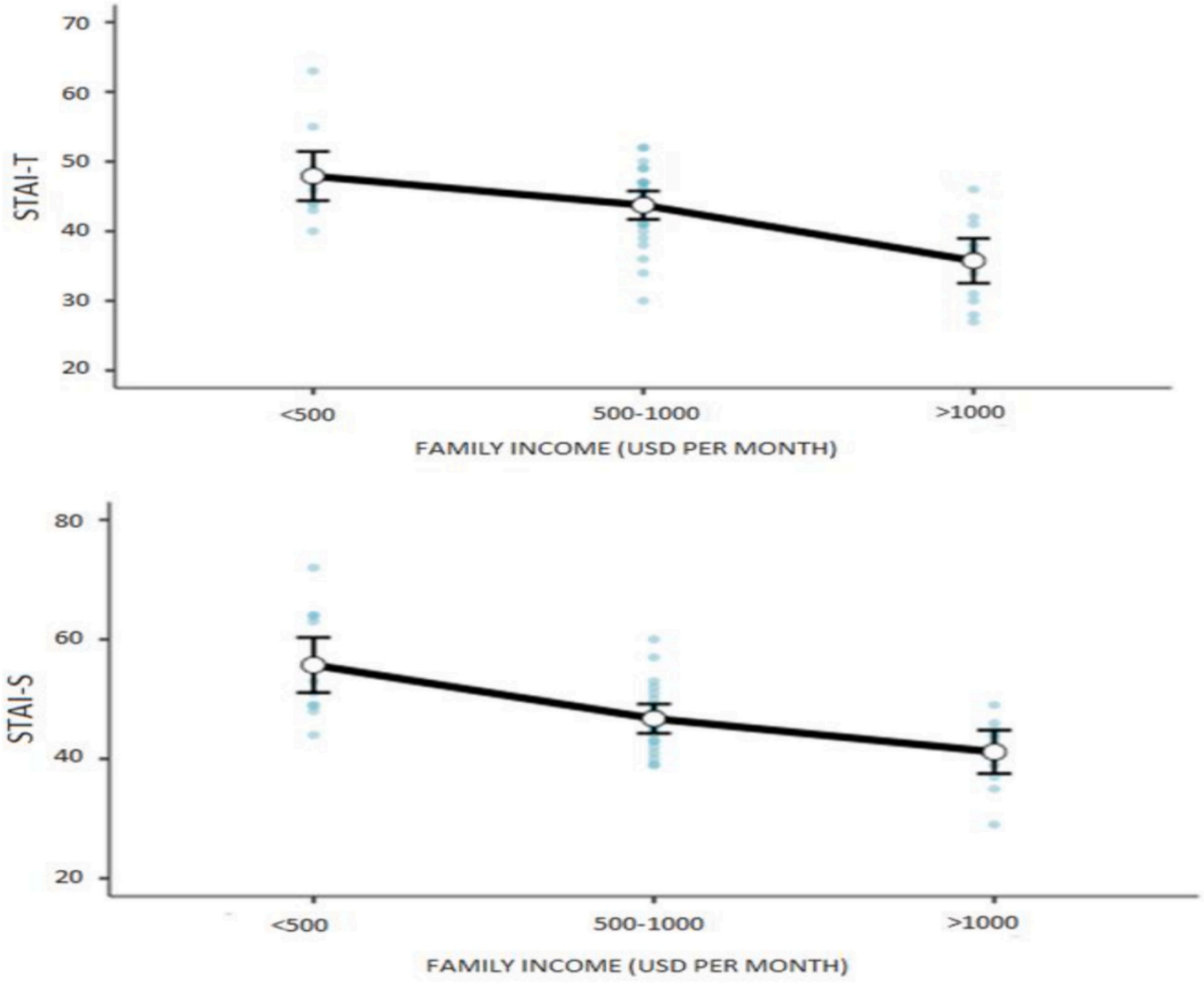

Fig. 2. STAI-T and STAI-T correlations with family income among the febrile seizures group.

STAI-S score was 9 points lower (95% CI: 3.8–14.3) in the 500–1000 USD/month group compared to those earning less than 500 USD/month ($p < 0.001$), and 5.6 points higher (95% CI: 4.9–6.2) in the >1000 USD/month group ($p < 0.001$). The model explained 40.5% of the variance ($R^2 = 0.405$) (Fig. 2).

5. Discussion

FS is a common condition in children and is usually benign, but it can be frightening for parents and is sometimes perceived as life-threatening (Kolahi & Tahmooreszadeh, 2009; Westin & Sund Levander, 2018).This emphasizes the importance of addressing parental anxiety in FS management. Our study looked at the anxiety levels of mothers of children with FS, as well as the sociodemographic factors that may influence their anxiety. Our research findings show that the anxiety levels of mothers, as measured by the STAI-S and STAI-T scales, are significantly associated with socioeconomic and demographic factors.

Following the first FS, parents may experience physical effects such as loss of appetite, sleep disturbances, gastrointestinal discomfort, and weight loss (Parmar et al., 2001), as well as psychological effects such as fear of their child's death, concern about potential brain damage, and epilepsy development. This can cause post-traumatic stress, excessive anxiety, and fear of recurring seizures (Corsi et al., 2021). Consistent with earlier studies, our findings reinforce that FS is often interpreted as a threatening event, triggering both acute fear and persistent worry about long-term neurological outcomes. This aligns with previous research indicating that parental anxiety frequently stems from fear of death and permanent harm (Huang et al., 1998). Klotz et al. (2021) discovered that parents of children who had a non-triggering seizure or a first FS had high anxiety levels in both cases when assessed with the STAI (Klotz et al., 2021). Another study conducted in 2023 found high anxiety levels in mothers of children with FS on the Depression, Anxiety, and Stress Scale, which is consistent with our findings (Othman et al., 2023). In a study conducted in Japan, 41% of parents stated that they feared their children would die during a seizure, while 29% believed their children could be seriously injured (Kanemura et al., 2013). This finding suggests a strong link between anxiety and fear. Similarly, Maya and colleagues discovered a significant and positive link between anxiety and fear of negative evaluation. The findings show that there is a strong relationship between fear of negative evaluation and state and trait anxiety (Ganesh Kumar et al., 2015).

Recent evidence from Germany further substantiates our findings. In a cross-sectional study, Rice et al. reported that only one-third of parents accurately recognized their child's episode as a FS, while the perceived fear was exceptionally high, with a median rating of 10 out of 10 (Rice et al., 2022). Such heightened fear often leads to behavioral responses

such as unnecessary emergency visits or premature antipyretic use that can burden both families and healthcare systems. Complementary studies indicate that emotional adaptation improves when structured guidance is provided (Lange et al., 2023). Collectively, these studies underscore the critical role of timely and structured parental education in mitigating anxiety after FS, particularly during the acute post-event period. Importantly, these findings also align with the concept of 'fever phobia' a persistent, disproportionate fear of fever among caregivers, which remains common despite medical reassurance and is closely associated with increased parental anxiety, unnecessary emergency visits, and frequent antipyretic use (Merlo et al., 2023; Purssell & Collin, 2016). This phenomenon may further amplify maternal distress in the context of FS and should be addressed in the design of psychoeducational interventions.

In our study, socioeconomic factors such as income and education level were significantly associated with maternal anxiety, while maternal age showed a trend-level relationship. In particular, an inverse relationship was discovered between higher education, income level, and anxiety. According to the literature, higher education is associated with more effective coping and lower anxiety during FS (Enarson et al., 2012; Flury et al., 2001). One reason for increased anxiety in mothers with lower education may be limited understanding of seizure physiology and first aid (Sajadi & Khosravi, 2017). Furthermore, teaching families about fever prevention, FS education, and first aid methods has been shown to reduce parental anxiety and fear (Türe et al., 2020). This highlights the importance of tailoring educational interventions to families with limited health literacy.

Our findings show that the monthly income levels of mothers of children with FS influence the severity of their psychological distress. According to previous research on wealth and income, a family's financial situation is a significant predictor of parental distress (Papadopoulos, 2024). This finding is consistent with the literature, which suggests that higher-income families experience less stress and anxiety as a result of receiving more information and support about treatment processes and health (Caicedo, 2014; Huber & Weber, 2022; Ju et al., 2011). However, our findings show that there are inequalities in health-care utilization based on income. Mothers with lower incomes reported higher STAI-S and STAI-T scores. This suggests that socioeconomic factors have a significant impact on the perception and management of health events, highlighting the need for targeted interventions for financially disadvantaged mothers.

In our study, maternal age demonstrated a trend-level association with maternal anxiety scores. However, maternal age was not as strong a predictor as socioeconomic status. This may reflect a complex interplay of factors such as life experience, caregiving roles, and financial stability, all of which may mediate the influence of age. Previous research has shown that parents with older or multiple children are less likely to seek medical attention for febrile episodes (Enarson et al., 2012). This suggests that increased maternal age may contribute to improved coping and more measured decision making in acute pediatric situations such as FS though this association warrants further exploration in larger and more targeted samples.

Our findings carry important implications for pediatric emergency care. Mothers of children with FS particularly those with lower socioeconomic resources may benefit from early psychological screening during the emergency visit. Incorporating brief, structured anxiety assessments into triage workflows could help identify families at risk of heightened distress. Additionally, providing concise, evidence-based information about FS and first aid may reduce unnecessary fear, prevent avoidable emergency revisits, and support more effective at home management.

This study has several limitations. It was conducted at a single center with a relatively small sample, and its cross-sectional design precludes causal inferences. Data on family history of FS and maternal health or digital literacy were not collected, which may have limited contextual interpretation. Moreover, only mothers were included due to their primary caregiving role; however, future research should also consider paternal perspectives. Another limitation is that anxiety was assessed approximately 12 h after admission rather than immediately following the febrile event, which may have affected the level of maternal distress captured at the time of assessment.

Although maternal age was significantly higher in the FS group compared to the control group, this variable was included as a covariate in our multivariate analyses to control for its potential confounding effect on anxiety levels. Therefore, the age difference between groups is unlikely to have introduced bias into the primary findings.

6. Conclusions

This study indicates that a child's first FS is associated with a pronounced elevation in maternal state anxiety relative to mothers of children presenting with fever without seizures. The pattern of findings suggests that the seizure episode functions as an acute stressor that amplifies immediate emotional distress beyond the burden of fever itself. By contrast, trait anxiety appears less tightly coupled to seizure exposure and more closely aligned with broader contextual factors, particularly socioeconomic resources. In this regard, lower socioeconomic position captured most consistently by household income, and, to a lesser extent, educational attainment was linked to higher levels of more enduring anxiety, pointing to a context-dependent vulnerability that may shape how families experience and recover from acute pediatric events.

These results have meaningful implications for both clinical practice and psychological science. Clinically, the findings support embedding brief, structured, psychologically informed communication into routine acute care for FS, alongside medical stabilization. Such communication should aim to reduce uncertainty, support adaptive coping, and provide clear guidance for future episodes, with particular attention to families facing socioeconomic constraints. From a research perspective, the dissociation between event-linked state anxiety and context-linked trait anxiety underscores the value of distinguishing transient emotional responses from more stable vulnerability in caregiver outcomes.

Future work should extend these findings using longitudinal designs to delineate recovery trajectories and identify mechanisms that sustain distress over time (e.g., uncertainty, threat appraisal, perceived control, and health literacy). Rigorous evaluations of scalable, low-intensity interventions delivered at the point of acute care are warranted, including attention to equity-sensitive implementation. Expanding assessment to fathers and other caregivers, and replicating findings across diverse settings, will further clarify generalizability and inform targeted support strategies.

CRediT authorship contribution statement

Elif Küçük: Writing – original draft, Validation, Software, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Mehmet Tolga Köle:** Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Gökşen Erkin:** Writing – original draft, Supervision, Resources, Methodology, Investigation, Formal analysis, Data curation. **İbrahim Kandemir:** Writing – review & editing, Software, Resources, Project administration, Methodology, Formal analysis, Data curation. **Feyza Husrevoglu Esen:** Writing – original draft, Visualization, Resources, Investigation, Funding acquisition, Data curation, Conceptualization. **Deniz Güven:** Writing – original draft, Software, Resources, Project administration, Funding acquisition, Formal analysis, Conceptualization. **Feride Uysal:** Writing – original draft, Validation, Supervision, Software, Resources, Data curation, Conceptualization. **Yasemin Akın:** Writing – original draft, Visualization, Supervision, Resources, Project administration, Investigation, Funding acquisition, Data curation, Conceptualization.

Author contributions

All authors reviewed the results and approved the final version of the manuscript.

Informed consent

The informed parental consent was not obtained due to retrospective nature of study and we had only used patients' electronic data without ID information.

Ethical approval

This study was approved by the ethics committee of Kartal Dr. Lutfi Kirdar City Hospital on 28.09.2022 with the decision number 2022/5 l4/234/28. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

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Declaration of competing interest

The Author declare that there is no conflict of interest.

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Data availability

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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