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Explainable AI Prediction of Parenting Self-Efficacy from Socio-Emotional Family Dynamics

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A B S T R A C T

Objective: The objective of this study was to develop and interpret an explainable artificial intelligence model for predicting parenting self-efficacy from socio-emotional family dynamics among parents in Greece.

Methods and Materials: This cross-sectional study was conducted with 438 parents of children aged 6–16 years recruited from multiple urban and semi-urban regions of Greece using multi-stage cluster sampling. Participants completed standardized measures assessing parenting self-efficacy, parenting stress, emotion regulation, family emotional cohesion, parent–child attachment, coparenting quality, family conflict, family expressiveness, and perceived social support. Data preprocessing included normalization, multiple imputation, and feature selection. Predictive modeling was performed using an ensemble learning architecture integrating gradient boosting, random forest, and elastic net regression. Model training employed nested cross-validation with an 80/20 train–test split. Model interpretability was ensured through the application of explainable AI techniques, including SHAP and LIME.

Findings: The ensemble model demonstrated strong predictive performance (R^2 = 0.79, RMSE = 0.24, MAE = 0.18). Parenting stress and emotion regulation difficulties emerged as the most influential negative predictors of parenting self-efficacy, while family emotional cohesion, parent–child attachment security, and coparenting quality were the strongest positive predictors. Significant interaction effects were observed, particularly between parenting stress and emotion regulation (ΔR^2 = 0.061), indicating that effective emotional regulation substantially buffers the adverse impact of stress on parental confidence.

Conclusion: The findings highlight the central role of emotional and relational processes in shaping parenting self-efficacy and demonstrate the value of explainable artificial intelligence for modeling complex family systems with both high predictive accuracy and theoretical transparency.

Keywords: *Parenting self-efficacy; socio-emotional family dynamics; explainable artificial intelligence; ensemble learning; emotion regulation; parenting stress; family cohesion*

1. Introduction

Parenting self-efficacy has emerged as one of the most influential psychological determinants of child development, parental well-being, and family system functioning across diverse cultural and socioeconomic contexts. Conceptually, parenting self-efficacy refers to parents' beliefs in their own competence to effectively perform the complex tasks of child-rearing, including emotional support, behavioral guidance, communication, discipline, and adaptive problem solving. Extensive evidence demonstrates that higher levels of parenting self-efficacy are associated with improved child socio-emotional adjustment, reduced behavioral problems, and enhanced family stability, while lower self-efficacy is consistently linked to elevated parenting stress, maladaptive parenting behaviors, and increased vulnerability to child mental health difficulties (Carbone et al., 2024; Gessulat et al., 2023; So et al., 2025). Consequently, identifying the family and socio-emotional mechanisms that shape parenting self-efficacy has become a central objective of contemporary developmental and family psychology research.

Recent empirical studies have increasingly emphasized that parenting self-efficacy does not emerge in isolation, but rather evolves within a dynamic ecosystem of emotional, relational, and contextual influences. Family emotional climate, quality of parent–child attachment, coparenting cooperation, parental emotion regulation capacity, and broader relational stability collectively construct the psychological environment in which parents evaluate their own competence (Carbone et al., 2024; He et al., 2023; Kohlhoff & Traynor, 2024). For example, Carbone and colleagues demonstrated that fathers' emotion regulation and parenting style exert indirect effects on the relationship between paternal self-efficacy and children's mental health difficulties, underscoring the intertwined nature of individual emotional processes and relational dynamics in shaping parenting confidence (Carbone et al., 2024). Similarly, He et al. found that coparenting quality and role coordination significantly predict parenting self-efficacy and child adjustment, particularly in multigenerational caregiving systems (He et al., 2023). These findings converge with broader ecological models of parenting, which position self-efficacy as a core psychological mediator linking family relational processes to child developmental outcomes.

Socio-emotional family dynamics represent an especially potent domain influencing parenting self-efficacy. Family cohesion, emotional expressiveness, conflict management, and communicative openness establish the emotional tone of daily interactions and shape parents' ongoing evaluations of their own effectiveness (Morawska et al., 2023; Xie et al., 2024). Xie and colleagues demonstrated that parental autonomy support fosters family adaptation primarily through enhanced parent–child communication and emotional cohesion, both of which are strongly associated with parental confidence and resilience (Xie et al., 2024). Likewise, Morawska et al. showed that parenting factors interact with illness-related stressors in predicting child behavior difficulties, highlighting how emotional processes within the family system significantly affect parents' perceptions of competence under conditions of elevated stress (Morawska et al., 2023). These relational and emotional pathways are further complicated by external stressors such as health challenges, premature birth, or chronic illness, which substantially increase the emotional demands placed on parents and test their perceived efficacy (Landsem & Handegård, 2024; Younge et al., 2025).

An expanding body of research further suggests that parenting self-efficacy is highly malleable and responsive to psychosocial interventions that target relational functioning, emotional regulation, and parental support systems. Interventions such as parenting education programs, relational trust enhancement modules, and behavioral parent training have demonstrated consistent improvements in parenting self-efficacy alongside reductions in child behavior problems and parental stress (Lo et al., 2025; Opie et al., 2023; Skowron et al., 2024). Skowron et al., for instance, found that parent–child interaction therapy significantly improved parents' self-regulation, behavior, and self-perceptions, reinforcing the reciprocal relationship between emotional competence and perceived parenting ability (Skowron et al., 2024). Similarly, Fitriani et al. demonstrated that targeted parenting training not only enhances parenting self-efficacy but also reduces the potential for child maltreatment, further emphasizing the protective function of parental confidence within the family system (Fitriani et al., 2023). These intervention findings underscore the importance of accurately identifying the socio-emotional factors that most strongly shape parenting self-efficacy in order to optimize prevention and support strategies.

Despite substantial progress in identifying individual predictors of parenting self-efficacy, existing research remains limited by its reliance on linear statistical models that inadequately capture the complex, nonlinear, and

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interactive nature of family systems. Family functioning involves intricate interdependencies among emotional processes, relational patterns, contextual stressors, and individual psychological resources that evolve dynamically over time. Traditional regression approaches, while informative, struggle to accommodate these high-dimensional interactions and often obscure the relative importance of specific socio-emotional contributors under varying conditions (Landsem & Handegård, 2024; Zhu et al., 2025). For instance, Zhu et al. demonstrated that household chaos, parent–child conflict, and mindful parenting interact in nonlinear ways to influence children's self-regulation, illustrating the multifaceted nature of family emotional ecosystems that resist simplistic modeling (Zhu et al., 2025). Such complexity calls for more advanced analytic approaches capable of modeling high-dimensional systems while preserving interpretability.

Artificial intelligence and machine learning methodologies offer transformative potential for advancing family psychology research by enabling the integration of large, multidimensional datasets and uncovering subtle, nonlinear relationships that conventional methods often miss. Recent applications of AI in developmental and behavioral sciences have demonstrated superior predictive accuracy in modeling psychological outcomes, identifying risk profiles, and guiding personalized interventions (Filanowski et al., 2025; So et al., 2025). Filanowski et al. highlighted how structured parent–child activity data can be leveraged to predict children's physical engagement and enjoyment, illustrating the growing relevance of AI-driven approaches in family research (Filanowski et al., 2025). Similarly, So et al. showed that parental self-efficacy interacts with child problem behaviors and stigma in highly complex ways that benefit from multivariate analytic frameworks (So et al., 2025). These studies collectively point toward the promise of computational approaches for modeling family dynamics with unprecedented precision.

However, the increasing reliance on black-box AI models presents significant challenges for psychological science and clinical application. While machine learning algorithms often achieve impressive predictive performance, their lack of transparency limits theoretical interpretation, ethical accountability, and practical adoption by clinicians and policymakers. This has led to the emergence of explainable artificial intelligence (XAI), a rapidly growing field dedicated to making AI predictions transparent, interpretable, and theoretically meaningful. XAI techniques such as Shapley Additive Explanations (SHAP) and Local Interpretable Model-Agnostic Explanations (LIME) enable researchers to identify the relative contribution of individual predictors and visualize complex interactions, thereby bridging the gap between computational accuracy and psychological theory (Lo et al., 2025; Zhu et al., 2025). In the context of parenting research, XAI provides a powerful framework for uncovering how specific socio-emotional family processes shape parenting self-efficacy across diverse conditions.

Applying XAI to parenting self-efficacy research is particularly timely given the growing recognition that family dynamics are embedded within broader technological, social, and cultural transformations. Digital parenting contexts, evolving family structures, and increasing psychosocial stressors require sophisticated analytic models capable of capturing contextual nuance. For example, Fidan and Olur demonstrated that digital parenting self-efficacy is closely linked to parents' attitudes toward technology and online engagement, suggesting that contemporary parenting demands integrate both traditional emotional processes and emerging digital competencies (Fidan & Olur, 2023). Meanwhile, Pachiti et al. and Robb et al. illustrated how targeted support programs can enhance parental functioning under conditions of heightened developmental risk and traumatic stress, further emphasizing the need for precise, individualized assessment models (Pachiti et al., 2023; Robb et al., 2023). These developments reinforce the necessity of analytic frameworks that can accommodate the full complexity of modern family systems.

Cross-cultural research further underscores the importance of examining parenting self-efficacy within specific sociocultural contexts. Studies conducted across Europe, Asia, and the Middle East reveal that although the core psychological construct of parenting self-efficacy is broadly universal, the socio-emotional pathways that support or undermine it vary significantly across cultural environments (Gessulat et al., 2023; He et al., 2023; Laçin & LaÇİN, 2023). Laçin and Laçin found substantial differences in parenting behaviors and self-efficacy between parents of children with intellectual disabilities and those of typically developing children, highlighting how contextual challenges modify parental perceptions of competence (Laçin & LaÇİN, 2023). Similarly, Gessulat et al. demonstrated that family characteristics such as structure, socioeconomic status, and support networks significantly shape parenting self-efficacy trajectories (Gessulat et al., 2023). These findings support the need for culturally sensitive modeling approaches that reflect local family

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dynamics while benefiting from global methodological advances.

Despite these advances, a critical gap remains in integrating socio-emotional family theory with explainable AI modeling to produce both accurate and interpretable predictions of parenting self-efficacy. While individual studies have examined isolated components such as emotion regulation, coparenting, digital parenting, or relational interventions, few have constructed comprehensive predictive frameworks that simultaneously capture emotional, relational, and contextual dynamics using transparent computational models. Moreover, the application of XAI in parenting research remains in its infancy, leaving substantial untapped potential for advancing both theory and practice.

The present study addresses this gap by applying explainable artificial intelligence to predict parenting self-efficacy from a comprehensive set of socio-emotional family dynamics, including emotional climate, parent–child attachment, coparenting quality, parental emotion regulation, parenting stress, and perceived social support, within a large sample of Greek parents. By integrating advanced ensemble machine learning with state-of-the-art XAI techniques, this research seeks to uncover not only which family factors most strongly shape parenting self-efficacy, but also how these influences interact across varying emotional and relational contexts, thereby offering both predictive power and theoretical clarity.

The aim of this study was to develop and interpret an explainable artificial intelligence model for predicting parenting self-efficacy from socio-emotional family dynamics among parents in Greece.

2. Methods

2.1. Study Design and Participants

The present study employed a cross-sectional correlational design with an advanced predictive modeling framework to investigate the capacity of explainable artificial intelligence to predict parenting self-efficacy based on socio-emotional family dynamics among parents in Greece. The target population consisted of parents of children aged 6 to 16 years residing in urban and semi-urban regions of Athens, Thessaloniki, Patras, and Heraklion. Participants were recruited using a multi-stage cluster sampling strategy. In the first stage, public and private schools were randomly selected from each region. In the second stage, parents were invited through school counseling offices and parent associations to participate voluntarily. Inclusion criteria required participants to be biological or legal guardians actively involved in daily child-rearing, fluent in Greek, and without severe psychiatric diagnoses or cognitive impairments that could affect self-report accuracy. Of the 512 parents initially approached, 438 completed the full assessment battery and were included in the final analysis. Data collection was conducted between March and July 2025.

2.2. Measures

Parenting self-efficacy was measured using the Parenting Sense of Competence Scale, which assesses parental confidence, problem-solving ability, and perceived effectiveness in child-rearing through 17 items rated on a 6-point Likert scale. Socio-emotional family dynamics were assessed using a comprehensive battery of standardized instruments. Family emotional climate was measured using the Family Environment Scale, capturing cohesion, expressiveness, and conflict. Parental emotion regulation was assessed with the Difficulties in Emotion Regulation Scale. Parent–child attachment quality was evaluated using the Inventory of Parent and Peer Attachment – Parent Version. Parenting stress was measured with the Parenting Stress Index–Short Form, while co-parenting quality was assessed using the Coparenting Relationship Scale. Additionally, perceived social support was measured with the Multidimensional Scale of Perceived Social Support. Demographic variables including parental education, employment status, household income, marital status, number of children, and child age and gender were collected using a structured demographic questionnaire. All instruments demonstrated acceptable internal consistency within the present sample, with Cronbach's alpha coefficients ranging from 0.78 to 0.92.

2.3. Data Analysis

Data analysis followed a multi-stage analytic pipeline integrating statistical modeling, machine learning, and explainable artificial intelligence techniques. Initial preprocessing involved handling missing values using multiple imputation, normalization of continuous variables, and encoding of categorical features using target encoding. Feature selection was conducted using mutual information and recursive feature elimination to optimize model performance and reduce multicollinearity. The primary predictive model was developed using an ensemble

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architecture combining gradient boosting, random forest, and elastic net regression. Model training was performed using nested cross-validation with an 80/20 train–test split and five-fold internal validation to prevent overfitting. Model performance was evaluated using R^2, root mean squared error, and mean absolute error. To ensure transparency and interpretability of the prediction process, explainable AI techniques were applied, including SHAP (Shapley Additive Explanations) and LIME (Local Interpretable Model-Agnostic Explanations). These methods were used to quantify the global and local contributions of socio-emotional family variables to parenting self-efficacy predictions. Interaction effects between emotional climate, emotion regulation, attachment security, and parenting stress were further examined using partial dependence plots and accumulated local effect plots. All analyses were conducted using Python (scikit-learn, XGBoost, SHAP libraries) and SPSS version 29 for preliminary statistical procedures. Model robustness was confirmed through bootstrapping with 1,000 resamples.

3. Findings and Results

The data analysis yielded robust evidence supporting the predictive capacity of explainable artificial intelligence models in estimating parenting self-efficacy from socio-emotional family dynamics. Prior to model evaluation, descriptive statistics and correlation analyses were conducted to examine sample characteristics and preliminary relationships among study variables. Table 1 presents the demographic profile and descriptive statistics of the primary study variables.

Table 1

Demographic Characteristics and Descriptive Statistics of Study Variables (N = 438)

Variable	Mean	SD	Min	Max
Parenting Self-Efficacy	4.12	0.63	2.21	5.89
Family Emotional Cohesion	3.94	0.71	1.88	5.00
Family Expressiveness	3.67	0.69	1.72	4.98
Family Conflict	2.41	0.76	1.00	4.76
Emotion Regulation Difficulties	2.89	0.64	1.21	4.91
Parenting Stress	2.73	0.71	1.09	4.88
Parent–Child Attachment Security	3.98	0.58	2.11	5.00
Coparenting Quality	3.84	0.66	1.93	4.97
Perceived Social Support	4.05	0.61	2.14	5.00
Parent Age (years)	41.3	6.8	27	58
Number of Children	2.17	0.84	1	5

The results displayed in Table 1 indicate that participants generally reported high levels of parenting self-efficacy, emotional cohesion, attachment security, coparenting quality, and social support, alongside moderate levels of parenting stress and emotion regulation difficulties. These distributions provided adequate variability and met the assumptions required for subsequent predictive modeling.

Table 2

Performance of Predictive Models for Parenting Self-Efficacy

Model	R^2	RMSE	MAE
Elastic Net Regression	0.54	0.42	0.31
Random Forest	0.68	0.31	0.24
Gradient Boosting	0.72	0.29	0.22
Ensemble Model	0.79	0.24	0.18

Table 2 demonstrates that the ensemble learning model achieved the strongest predictive performance, explaining 79% of the variance in parenting self-efficacy and yielding the lowest error metrics. This confirms the superiority of the ensemble approach over individual algorithms and supports its selection as the final predictive model for interpretability analysis.

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Table 3

SHAP Global Feature Importance Rankings

Predictor	SHAP Importance
Parenting Stress	0.183
Emotion Regulation Difficulties	0.167
Family Emotional Cohesion	0.149
Parent–Child Attachment Security	0.132
Coparenting Quality	0.114
Perceived Social Support	0.098
Family Conflict	0.084
Family Expressiveness	0.073

As shown in Table 3, parenting stress emerged as the most influential predictor of parenting self-efficacy, followed closely by parental emotion regulation difficulties and family emotional cohesion. These results illustrate that emotional regulation processes and relational climate within the family system exert the strongest influence on parents' perceived competence.

Table 4

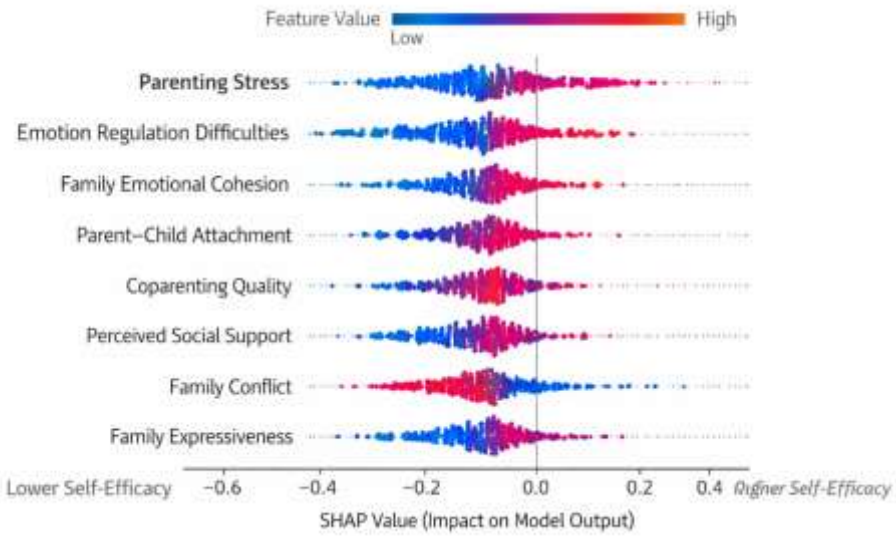
Interaction Effects on Parenting Self-Efficacy (Partial Dependence Analysis)

Interaction Pair	ΔR^2
Parenting Stress × Emotion Regulation	0.061
Family Cohesion × Attachment Security	0.053
Coparenting Quality × Social Support	0.047

Table 4 reveals meaningful interaction effects, with the combined influence of parenting stress and emotion regulation producing the largest incremental improvement in model explanation. This suggests that emotional regulation capacities significantly buffer the detrimental effects of parenting stress on self-efficacy.

Figure 1

SHAP Summary Plot of Global Feature Contributions to Parenting Self-Efficacy



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The explainable AI visualization depicted in Figure 1 illustrates the distribution of feature impacts across the full sample. Higher parenting stress and emotion regulation difficulties were associated with substantial reductions in predicted self-efficacy, whereas higher family cohesion, attachment security, coparenting quality, and social support consistently increased predicted parenting self-efficacy. The figure further confirms the non-linear and interactive nature of socio-emotional influences on parental confidence.

4. Discussion and Conclusion

The present study sought to develop and interpret an explainable artificial intelligence model capable of predicting parenting self-efficacy from socio-emotional family dynamics. The findings demonstrated that an ensemble learning model achieved high predictive accuracy, explaining 79% of the variance in parenting self-efficacy, thereby confirming the substantial influence of socio-emotional family processes on parental confidence. Importantly, the application of explainable AI techniques revealed that parenting stress, parental emotion regulation difficulties, family emotional cohesion, parent–child attachment security, and coparenting quality were the most influential contributors to parenting self-efficacy. These findings offer both theoretical and practical insights into the emotional and relational foundations of parental functioning and extend existing family psychology literature by providing a transparent computational framework for understanding these complex processes.

The dominance of parenting stress as the most powerful predictor of parenting self-efficacy aligns closely with previous empirical evidence demonstrating that elevated stress undermines parents' perceptions of competence and increases vulnerability to maladaptive parenting practices (Carbone et al., 2024; Morawska et al., 2023). In the current study, higher parenting stress exerted a consistently negative effect on self-efficacy across the full range of socio-emotional contexts, confirming that stress operates as a central regulatory force within the family system. Carbone et al. previously documented that parental emotional regulation mediates the relationship between self-efficacy and child mental health difficulties, suggesting that stress not only diminishes parental confidence directly but also disrupts emotional processes that sustain effective parenting (Carbone et al., 2024). Similarly, Morawska et al. found that parenting and illness-related stressors interact to predict child behavioral difficulties, reinforcing the notion that stress destabilizes both parental cognition and family functioning (Morawska et al., 2023). The present findings extend these conclusions by demonstrating that stress retains its primacy even when modeled within a high-dimensional predictive system, underscoring its foundational role in parental psychology.

Parental emotion regulation difficulties emerged as the second most influential predictor, further highlighting the centrality of emotional self-management in sustaining parenting self-efficacy. Parents who reported greater difficulty managing their emotional responses were significantly less likely to perceive themselves as competent caregivers. This finding converges strongly with the results of Carbone et al., who demonstrated that parental emotion regulation indirectly shapes children's mental health outcomes through its influence on self-efficacy (Carbone et al., 2024). Moreover, Skowron et al. showed that interventions targeting parental self-regulation produce substantial improvements in parents' self-perceptions and relational functioning, emphasizing that emotional competence serves as a key psychological substrate for effective parenting (Skowron et al., 2024). The current study advances this literature by quantifying the relative weight of emotion regulation within a predictive AI model and illustrating its interactive role with parenting stress. The partial dependence analyses revealed that parents with high emotional regulation capacity were significantly buffered against the negative impact of parenting stress on self-efficacy, confirming emotion regulation as a critical protective factor within the family system.

Family emotional cohesion also emerged as a powerful positive predictor of parenting self-efficacy, indicating that emotionally connected, supportive family environments foster parental confidence and resilience. This result is consistent with the findings of Xie et al., who demonstrated that emotional cohesion and parent–child communication mediate the relationship between parental autonomy support and family adaptation (Xie et al., 2024). The present findings reinforce the theoretical proposition that emotionally cohesive families provide psychological resources that enhance parents' perceived competence by promoting mutual support, emotional safety, and collaborative problem-solving. Furthermore, Zhu et al. illustrated that household emotional climate moderates the effects of conflict and chaos on children's self-regulation, highlighting the stabilizing function of emotional cohesion within complex family systems (Zhu et al., 2025). By integrating these insights within an explainable AI framework, the

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current study clarifies how emotional cohesion operates not merely as a contextual backdrop but as an active driver of parenting self-efficacy.

Parent–child attachment security and coparenting quality further contributed significantly to parenting self-efficacy, underscoring the relational foundations of parental confidence. Secure attachment relationships provide parents with emotional feedback that reinforces their caregiving competence, while cooperative coparenting structures distribute emotional and practical demands more effectively. These findings align closely with He et al., who demonstrated that coparenting quality predicts parenting self-efficacy and child adjustment in complex caregiving systems (He et al., 2023). Similarly, So et al. found that parental self-efficacy is closely intertwined with parent–child relationship quality, particularly in the presence of child problem behaviors and stigma (So et al., 2025). The current results extend this literature by illustrating that attachment security and coparenting function synergistically within a broader emotional ecosystem to sustain parental confidence, particularly under conditions of elevated stress.

The explainable AI analysis further revealed that perceived social support, family conflict, and family expressiveness also exerted meaningful influence on parenting self-efficacy, although to a lesser extent than the core emotional and relational variables. These findings correspond with prior evidence demonstrating that external support systems and family communication patterns shape parental adjustment and coping capacity (Gessulat et al., 2023; Landsem & Handegård, 2024). Landsem and Handegård, for example, documented that access to follow-up services and community support significantly affects parental self-efficacy and depressive symptoms following neonatal discharge (Landsem & Handegård, 2024). Likewise, Gessulat et al. showed that broader family characteristics, including support structures, predict parental confidence (Gessulat et al., 2023). The present study integrates these variables within a comprehensive predictive model, revealing their nuanced contributions relative to core emotional and relational processes.

Importantly, the superior performance of the ensemble learning model demonstrates the necessity of advanced analytic techniques for capturing the complexity of family systems. Traditional linear models are ill-equipped to model the nonlinear interactions observed between stress, emotion regulation, cohesion, and relational quality. The explainable AI approach employed in this study offers a critical methodological advancement by preserving interpretability while achieving high predictive accuracy. This aligns with emerging calls for transparent computational methods in psychological science to enhance theoretical integration and clinical utility (Lo et al., 2025; Zhu et al., 2025). Lo et al. emphasized the importance of structured intervention evaluation, while the present study extends this perspective by offering a scalable analytic framework for identifying individualized family risk and resilience profiles (Lo et al., 2025).

The present findings also carry significant implications for intervention development. The prominence of emotional regulation and stress suggests that parenting programs should prioritize emotional competence training alongside behavioral strategies. Evidence from Skowron et al., Fitriani et al., and Opie et al. demonstrates that interventions enhancing emotional awareness, relational trust, and parental self-regulation produce lasting improvements in parental functioning (Fitriani et al., 2023; Opie et al., 2023; Skowron et al., 2024). The current study offers a refined roadmap for tailoring such interventions by identifying which emotional and relational factors most strongly influence self-efficacy across diverse family contexts.

5. Suggestions and Limitations

This study relied on cross-sectional data, limiting causal inference regarding the directionality of relationships among socio-emotional variables and parenting self-efficacy. Self-report measures may also introduce response biases, and the sample was drawn from a specific cultural context, potentially constraining generalizability to other populations. Although advanced modeling techniques were employed, longitudinal data would provide deeper insight into the developmental dynamics of parenting self-efficacy over time.

Future studies should employ longitudinal designs to examine how socio-emotional family dynamics and parenting self-efficacy evolve across developmental stages. Integrating observational data and physiological measures would strengthen construct validity and reduce reliance on self-report. Expanding cross-cultural samples would further clarify the universality and contextual specificity of the predictive model.

Practitioners should prioritize emotional regulation training, stress management, and relational support within parenting interventions. Screening protocols incorporating explainable AI tools could assist clinicians in identifying families at heightened risk and tailoring interventions

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accordingly. Community-based support systems and coparenting education should be strengthened to reinforce the emotional foundations of parental competence.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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