Article

Not peer-reviewed version

Parental Stress in the Pediatric Intensive Care Unit: Influential Factors and Vulnerable Subgroups. A Cross-Sectional Study

Gema Girón-Poves , Jose Luis Díaz-Agea * , Guillermo Domenech-Asensi * , Jesús David Pastor-Rodríguez

Posted Date: 28 October 2025

doi: 10.20944/preprints202510.2140.v1

Keywords: intensive care units; pediatric; stress; psychological; psychological distress; anxiety; parents; PSSIH; DASS-42

 doi:10.20944/preprints202510.2140.v1

Article

Parental Stress in the Pediatric Intensive Care Unit: Influential Factors and Vulnerable Subgroups. A Cross-Sectional Study

Gema Girón-Poves [1], Jose Luis Díaz-Agea [2,*], Guillermo Domenech-Asensi [2,*] and Jesús David Pastor-Rodríguez [1]

[1] Health Sciences PhD Program, Catholic University of Murcia (UCAM), Campus de los Jerónimos nº 135, Guadalupe, 30107 Murcia, Spain

[2] Faculty of Nursing, University of Murcia, Campus de Ciencias de la Salud, Edificio LAIB/DEPARTAMENTAL, El Palmar-Murcia, 30120 Murcia, Spain

* Correspondence: agea@um.es (J.L.D.-A.); gdomenech@um.es (G.D.-A.)

Abstract

Background/Objectives: The hospitalization of a child in the Pediatric Intensive Care Unit (PICU) is one of the most stressful life events a family can experience. The critical nature of the illness, the complexity of the hospital environment, and the uncertainty of the prognosis place parents under considerable emotional strain. This study aimed to identify the most influential factors associated with parental stress and psychological distress in the PICU. **Methods:** A quantitative, cross-sectional analytical design was employed. Anonymous surveys were administered to assess parental stress and anxiety, along with sociodemographic and clinical variables. Data were collected using the Parental Stressor Scale: Infant Hospitalization (PSSIH) and the Depression Anxiety Stress Scale-42 (DASS-42), both validated in Spanish. **Results:** The highest-scoring stressor dimension was Images and/or Sounds (M = 2.03, SD = 0.97). Within the DASS-42, the Stress subscale yielded the highest mean score (M = 10.06, SD = 9.34). Significant positive correlations were found between emotional distress and perceived stressors. Inferential analyses indicated that fathers reported higher emotional stress ($p = .040$); parents without prior PICU experience reported greater clinical stress ($p = .049$); and participants with low income and limited family support showed significantly higher distress ($p < .05$). **Conclusions:** Parental stress in the PICU is a multifactorial phenomenon influenced primarily by sociodemographic characteristics and the clinical dimension of stressors. Identifying vulnerable subgroups—such as fathers, parents with low income, limited social support, or no prior PICU experience—can guide the implementation of targeted psychosocial interventions, thereby reducing the risk of adverse outcomes such as PTSD and improving family coping during the hospitalization process.

Keywords: intensive care units; pediatric; stress; psychological; psychological distress; anxiety; parents; PSSIH; DASS-42

1. Introduction

Hospitalization of a child in the Pediatric Intensive Care Unit (PICU) is considered one of the most stressful life events a family can experience [1]. The critical nature of the illness, the complexity of the hospital environment, and the uncertainty of the prognosis expose parents to an intense emotional strain. This burden frequently manifests as psychological distress, including high levels of stress, anxiety, and depression [2,3]. Such an emotional response is not only an acute reaction to trauma but may also have long-term consequences, with a significant prevalence of post-traumatic stress disorder (PTSD) symptoms, anxiety, and depression persisting months or even years after PICU discharge [4].

 doi:10.20944/preprints202510.2140.v1

How parents cope with the stress of their child's critical illness plays a crucial role in determining their psychological outcomes. Coping strategies oriented toward problem-solving and the mobilization of social support are generally associated with more adaptive adjustment, whereas avoidance or denial strategies tend to exacerbate distress [5]. Research on resilience highlights that parents who engage in adaptive coping demonstrate lower levels of anxiety and depression, while maintaining a stronger capacity to support their child during hospitalization [6].

Several studies have documented the high incidence of parental stress during PICU admission. For example, Astudillo et al. report that parental stress in this context is, in many cases, extreme, regardless of parents' sociodemographic characteristics [7]. However, the identification of specific stressors and their relationship with psychological distress is crucial for developing effective interventions to mitigate these effects. The "Parental Stressor Scale: Infant Hospitalization (PSSIH)" has allowed these stressors to be classified into dimensions such as Clinical (related to the child's appearance and condition), Environmental (images and sounds), and Communication with the healthcare team [8].

Parental psychological distress is not homogeneous and is influenced by a complex interaction of preexisting and peri-traumatic factors. Recent systematic reviews and meta-analyses conclude that parental psychological vulnerability is affected by variables such as perceived social support, socioeconomic status, and prior experience with intensive care environments [9,10]. It has been observed that parents with low income or those perceiving poor social support experience higher levels of anxiety and depression [11]. Moreover, lack of prior PICU experience may exacerbate stress associated with medical procedures and the technological environment [9].

On the other hand, we find a meta-analyses which affirm that the intensity of peri-traumatic stressors—such as witnessing invasive procedures or experiencing feelings of helplessness—is a key predictor of long-term psychopathology [12]. These findings highlight the urgency of implementing preventive approaches during the acute phase of hospitalization.

Despite the evidence regarding the presence of distress, there remains a need for studies that integrate analyses of how specific PICU-related stressors correlate directly with subscales of anxiety, depression, and stress measured by validated instruments, and how these relationships vary according to parents' sociodemographic characteristics. A deeper understanding of these interrelationships is essential to design more accurate, personalized psychosocial support strategies adapted to each PICU.

Therefore, the main objective of this study is to identify the most influential factors on parental stress and psychological distress in the PICU setting, analyzing the relationship between dimensions of perceived stressors (PSSIH) [13,14] and levels of depression, anxiety, and stress (DASS-42) [15], while considering sociodemographic and clinical variables. In this way, measures could be implemented to prevent the consequences of a traumatic process [12,16].

2. Materials and Methods

This study employed a quantitative, cross-sectional analytical design and was conducted at the Hospital Clínico Universitario Virgen de la Arrixaca (Murcia, Spain). Data collection took place between September 2022 and September 2023 using anonymous self-administered questionnaires. These questionnaires assessed parental anxiety and stress levels through validated psychometric instruments, and also collected sociodemographic information from the parents and clinical data related to the hospitalized child. This study adheres to the STROBE guidelines for reporting cross-sectional studies.

2.1. Study Population and Sample

The study population consisted of mothers and fathers of pediatric patients admitted to the Pediatric Intensive Care Unit (PICU). Families were eligible for inclusion if they had legal guardianship of the admitted child, the length of hospitalization exceeded 24–48 hours, and they

 doi:10.20944/preprints202510.2140.v1

agreed to participate voluntarily. The exclusion criterion was the presence of a language barrier that could interfere with comprehension of the instruments.

A sample size calculation was conducted prior to data collection to ensure adequate statistical power. A total of 68 questionnaires were distributed to eligible families. Of these, 33 were returned, but one was incomplete and therefore excluded. The final sample included 32 valid participants. Participation was entirely voluntary and anonymous. Before enrollment, the study's objectives and procedures were explained to eligible parents, who were then invited to participate. Those who agreed were given the questionnaire, which they completed and returned later.

2.2. Instruments

The research instrument was a structured questionnaire composed of three main sections:

Sociodemographic and clinical information: demographic characteristics of the family (e.g., age, sex, educational level, employment status, household income) and clinical variables of the child (e.g., diagnosis, length of stay).

Parental Stressor Scale: Infant Hospitalization (PSSIH) [13,14]: a validated instrument that measures parental stress associated with a child's hospitalization in the PICU. The PSSIH comprises 37 items grouped into three major dimensions: clinical aspects (appearance and condition of the child), communication with the healthcare team, and environmental/emotional stressors (e.g., sights, sounds, and parental feelings).

Depression, Anxiety and Stress Scales (DASS-42) [15]: a 42-item instrument that evaluates emotional states of depression, anxiety, and stress. The Spanish validated version was used in this study.

2.3. Data Collection Procedure

Eligible participants were approached by the research team during the child's admission. After receiving an explanation of the study objectives and procedures, parents were invited to participate. Questionnaires were distributed in paper format, filled out individually by each participant, and returned confidentially to the research team.

2.4. Data Analysis

Data were analyzed using IBM SPSS® Statistics version 28. Descriptive analyses were performed to calculate means and standard deviations (SD) for quantitative variables, and frequency distributions for categorical variables.

Inferential analyses included the Shapiro–Wilk test to assess normality of distributions. Group comparisons were carried out using the Student's t-test for normally distributed variables and the Mann–Whitney U test when normality was not met. Correlations between continuous variables were examined using the Pearson correlation coefficient (for normally distributed data) or the Spearman rank correlation coefficient (for non-normally distributed data). Associations between categorical variables were tested using the chi-squared test. A two-tailed significance level of $p < 0.05$ was considered statistically significant.

3. Results

3.1. Sample Description

The sample consisted of N = 32 participants. The majority were women (81.3%, n = 26), of Spanish nationality (84.4%, n = 27), and married (65.6%, n = 21). Regarding educational level, the sample was primarily distributed between higher education (31.3%, n = 10) and primary education (31.3%, n = 10). The predominant employment status was permanent employment (58.1%, n = 18). With respect to social support, 68.8% (n = 22) of parents reported having close relatives or friends available to

 doi:10.20944/preprints202510.2140.v1

provide support. It is noteworthy that 68.8% (n = 22) of participants had no previous experience with the PICU.

The mean age was 39.03 years (SD = 8.64), with values ranging from 23 to 64 years. The average number of children per family was 2.28 (SD = 1.11). Sociodemographic and clinical characteristics of the sample are presented in Tables 1 and 2. On average, households were composed of 4.13 members (SD = 1.08), and participants reported having a mean of 2.28 children (SD = 1.11). Regarding the children admitted to the PICU, the mean gestational age at birth was 39.32 weeks (SD = 2.34), with a minimum of 32 and a maximum of 43 weeks. The mean birth weight was 3,215.32 grams (SD = 482.30), ranging from 1,700 to 4,050 grams.

Table 1. Profile of participants according to qualitative variables.

Variable	Category	*n*	%
Sex	Female	26	81.3
	Male	6	18.8
Nationality	Spanish	27	84.4
	Other	5	15.6
Marital status	Single	4	12.5
	Married	21	65.6
	Cohabiting partner	5	15.6
	Separated/Divorced	1	3.1
	Widowed	1	3.1
Educational level	No formal education	3	9.4
	Primary education (EGB/ESO)	10	31.3
	Secondary education (Vocational training, intermediate level)	4	12.5
	Secondary education (Vocational training, advanced level)	5	15.6
	Higher education	10	31.3
Employment status	Unemployed	9	29.0
	Temporary employment	4	12.9
	Permanent employment	18	58.1
Monthly household income	< €700	5	16.1
	€700–1000	5	16.1
	€1000–1500	8	25.8
	€1500–2000	8	25.8
	> €2000	5	16.1
Available support	Yes, but with difficulty due to personal circumstances or distance	10	31.2
	Yes, I have close relatives/friends available for support	22	68.8
Previous PICU experience	No	22	68.8
	Yes	10	31.2
Type of delivery	Vaginal delivery	19	59.4
	Instrumental delivery	4	12.5
	Scheduled cesarean section	6	18.8
	Emergency cesarean section	3	9.4
Reason for admission	Cardiological	4	12.1
	Gastrointestinal	2	6.1
	Surgical	6	18.2
	Infectious	3	9.1
	Oncological	3	9.1

 doi:10.20944/preprints202510.2140.v1

	Respiratory	8	24.2
	Neurological	2	6.1
	Other	5	15.1

Table 2. Characteristics of participants according to quantitative variables.

Variable	*N*	Minimum	Maximum	Mean	SD
Age (years)	31	23	64	39.03	8.64
Number of people living in the household	31	2	8	4.13	1.08
Number of children	32	1	6	2.28	1.11
Gestational age at birth (weeks)	31	32	43	39.32	2.34
Birth weight (g)	31	1700	4050	3215.32	482.30

Note. N = number of cases; SD = standard deviation.

3.2. Descriptive Analysis of Parental Stressors (PSSIH)

Parental stress levels were assessed using the Parental Stressor Scale: Infant Hospitalization (PSSIH). The descriptive analysis of the PSSIH dimensions is presented in Table 3. The highest stressor scores were observed in the Images and Sounds dimension (M = 2.03, SD = 0.97) and in Procedures and Interventions (M = 1.65, SD = 0.92), indicating that the technological environment and medical procedures represented the most stressful aspects for parents. In contrast, the Behavior of the Professional Team dimension obtained the lowest mean score (M = 0.75, SD = 0.56), suggesting that parents perceived fewer stressors related to staff attitudes and performance. The Total Clinical Dimension averaged 1.33 (SD = 0.64), while the Total Emotional Dimension showed a mean of 1.23 (SD = 0.95), with particularly elevated values for the child's emotional behavior (M = 1.41, SD = 1.09). The Communication with the Team dimension presented the lowest overall mean among the aggregated domains (M = 0.40, SD = 0.57).

Table 3. Descriptive values obtained for the analyzed dimensions.

Dimension	*N*	Minimum	Maximum	Mean	SD
Total Clinical Dimension	31	0.11	3.07	1.33	0.64
Child's appearance	31	0.00	3.33	0.90	1.03
Images and sounds	31	0.00	4.50	2.03	0.97
Procedures and interventions	31	0.29	3.43	1.65	0.92
Behavior of the professional team	31	0.00	2.25	0.75	0.56
Total Communication with the team	30	0.00	2.50	0.40	0.57
Total Emotional Dimension	31	0.00	3.45	1.23	0.95
Child's emotional behavior	31	0.00	3.30	1.41	1.09
Parental role	31	0.00	4.00	1.04	1.39

Note. N = number of cases; SD = standard deviation.

Statistically significant differences were found in stressor scores according to various sociodemographic and clinical variables (Table 4):

Sex: A significant difference was observed in the Total Emotional Dimension (p = .040), with men (M = 1.92, SD = 0.56) reporting higher levels of emotional stress than women (M = 1.10, SD = 0.96).

Nationality: Participants of non-Spanish nationality (M = 1.66, SD = 0.97) reported significantly higher stress in the Child's Appearance dimension (p = .035) compared with Spanish participants (M = 0.75, SD = 0.99).

Previous PICU experience: Parents without prior PICU experience (M = 1.47, SD = 0.58) reported higher stress in the Total Clinical Dimension (p = .049) than those with previous experience (M = 1.05, SD = 0.71).

 doi:10.20944/preprints202510.2140.v1

Income level: Parents with a monthly income below €1000 showed significantly higher stress in both the Total Emotional Dimension (p = .030) and the Images and Sounds dimension (p = .015) compared with higher-income participants.

Family support: Participants who reported difficulty obtaining support scored higher in the Total Emotional Dimension (M = 1.88, SD = 0.77 vs. M = 0.96, SD = 0.90; p = .006) and in the Child's Emotional Behavior dimension (M = 2.38, SD = 1.02 vs. M = 1.02, SD = 0.86; p < .001) compared with those who had available support.

Prior knowledge of the PICU: Participants without prior knowledge of the PICU reported higher stress in the Procedures and Interventions dimension (M = 2.07, SD = 0.57) than those with such knowledge (M = 1.46, SD = 1.00; p = .021).

Table 4. Significant differences between sociodemographic/clinical factors and scores in the analyzed dimensions (only factors with significant differences are shown).

Factor	Dimension	Category	n	Mean	SD	p	95% CI
Sex	Total Emotional Dimension	Female	26	1.10	0.96	.040*	-1.74, 0.10
		Male	5	1.92	0.56		
Nationality	Child's Appearance (CD)	Spanish	26	0.75	0.99	.035*	-1.90, 0.08
		Other	5	1.66	0.97		
Previous PICU experience	Total Clinical Dimension	No	21	1.47	0.58	.049*	-0.08, 0.90
		Yes	10	1.05	0.71		
Income level	Total Emotional Dimension	< €1000/month	10	1.66	0.78	.030*	-0.02, 0.97
		> €1000/month	20	1.19	0.52		
	Images and Sounds (CD)	< €1000/month	10	2.60	1.04	.015*	0.08, 1.52
		> €1000/month	20	1.80	0.83		
	Child's Emotional Behavior (ED)	< €1000/month	10	0.95	0.90	.038*	-1.59, 0.08
		> €1000/month	20	1.70	1.12		
Family support	Total Emotional Dimension	Yes, but with difficulty due to personal	9	1.88	0.77	.006*	0.21, 1.62

 doi:10.20944/preprints202510.2140.v1

		circumstances or distance					
		Yes, I have close relatives/friends available for support	22	0.96	0.90		
	Child's Emotional Behavior (CD)	Yes, but with difficulty due to personal circumstances or distance	9	2.38	1.02	< .001 *	0.62, 2.10
		Yes, I have close relatives/friends available for support	22	1.02	0.86		
Prior knowledge of the PICU	Procedures and Interventions (CD)	Yes	21	1.46	1.00	.021 *	-1.19, -0.02
		No	10	2.07	0.57		

*Note. N = number of cases; SD = standard deviation; p = statistical significance value; CI = confidence interval. *Statistically significant differences according to Student's t-test.*

The Pearson correlation analysis (Table 5) revealed a negative and statistically significant relationship between parental age and stress levels. Specifically, a negative correlation was found with the Total Clinical Dimension (r = –.410, p = .022) and with the Child's Appearance dimension (r = –.525, p = .002). This indicates that older parents tend to report lower stress levels in these dimensions.

Table 5. Relationship between parental age and the analyzed dimensions (only factors with significant differences are shown).

Dimension	*n*	*r*	*p*
Total Clinical Dimension	31	–.410	.022*
Child's Appearance (CD)	31	–.525	.002*

*Note. N = number of cases; r = Pearson correlation coefficient; p = statistical significance value. *Significant correlations according to Pearson's r test.*

3.3. Emotional Distress (DASS-42)

Emotional distress was assessed using the Depression, Anxiety, and Stress Scale (DASS-42). The subscale with the highest mean score was Stress (M = 10.06, SD = 9.34), followed by Anxiety (M = 8.70, SD = 9.53), and finally Depression (M = 7.20, SD = 9.01).

Table 6. Mean scores of the DASS-42 and its subscales.

Scale	*N*	Minimum	Maximum	Mean	SD
DASS-42 (total)	29	1	105	26.66	27.14

 doi:10.20944/preprints202510.2140.v1

Depression subscale	30	0	39	7.20	9.01
Anxiety subscale	30	0	35	8.70	9.53
Stress subscale	31	0	33	10.06	9.34

Note. N = number of cases; SD = standard deviation.

Regarding the distribution of the sample by severity ranges (Table 7), most participants fell within the Normal range across the three subscales. Nevertheless, a significant proportion of the sample reported Extremely Severe levels of Stress (9.7%), Anxiety (6.7%), and Depression (6.7%).

Table 7. Distribution of the sample across severity ranges of the subscales.

Severity range	Depression	%	Anxiety	%	Stress	%
Normal	20	66.7	19	63.3	24	77.4
Mild	6	20.0	1	3.3	2	6.5
Moderate	2	6.7	5	16.7	2	6.5
Extremely Severe	2	6.7	2	6.7	3	9.7

3.4. Correlation Between Emotional Distress (DASS-42) and Stressors (PSSIH)

Significant positive correlations were found between DASS-42 scores and stressor dimensions (Table 8), indicating that higher levels of emotional distress are associated with greater perceived stressors.

DASS-42 Total: Showed a positive correlation with the Total Clinical Dimension (r = .591, p < .001), Images and/or Sounds (r = .530, p = .004), and Procedures and Interventions (r = .467, p = .012).

Depression: Was significantly associated with the Total Clinical Dimension (r = .567, p = .001), Images and/or Sounds (r = .473, p = .010), and Procedures and Interventions (r = .373, p = .046).

Anxiety: Displayed the strongest correlation with the Total Clinical Dimension (r = .633, p < .001). It was also associated with Images and/or Sounds (r = .369, p = .049), Child's Emotional Behavior (r = .418, p = .024), and Parental Role (r = .413, p = .026).

Stress: Correlated positively with the Total Clinical Dimension (r = .454, p = .012), Images and/or Sounds (r = .643, p < .001), Child's Emotional Behavior (r = .366, p = .047), and Parental Role (r = .397, p = .030). The highest correlation among all subscales was observed between the Stress subscale and the Images and/or Sounds dimension (r = .643, p < .001).

Table 8. Relationship between DASS-42 total and subscale scores and stressor dimensions.

Scale / Subscale	Total Clinical Dimension	Images and/or Sounds (CD)	Procedures and Interventions (CD)	Total Emotional Dimension	Child's Emotional Behavior (ED)	Parental Role (ED)
DASS-42 Total	$r = .591 p < .001^* n = 28$	$r = .530 p = .004^* n = 28$	$r = .467 p = .012^* n = 28$	—	—	—
Depression subscale	$r = .567 p = .001^* n = 29$	$r = .473 p = .010^* n = 29$	$r = .373 p = .046^* n = 29$	—	—	—
Anxiety subscale	$r = .633 p < .001^* n = 29$	$r = .369 p = .049^* n = 29$	—	—	$r = .418 p = .024^* n = 29$	$r = .413 p = .026^* n = 29$
Stress subscale	$r = .454 p = .012^* n = 30$	$r = .643 p < .001^* n = 30$	—	—	$r = .366 p = .047^* n = 30$	$r = .397 p = .030^* n = 30$

Note. n = number of cases; *r* = Spearman's rho correlation coefficient; *p* = statistical significance value.
**Significant correlations according to Spearman's rho statistic.*

 doi:10.20944/preprints202510.2140.v1

4. Discussion

The analysis of our results confirms the high psychological and emotional vulnerability of parents during their child's admission to the PICU, as well as the role of sociodemographic and clinical factors in shaping this response. These findings provide an integrated perspective of stressors and emotional distress, highlighting both environmental and individual influences.

Our results revealed that the Clinical Dimension and the Images and/or Sounds Dimension were the stressors with the highest mean scores. In line with these findings, Ramírez et al. identified the clinical dimension as the most stressful factor for parents [8]. Similarly, Debelić et al. and Bogetz et al. found that disruption of the parental role was the most significant stressor, followed by the clinical dimension [17,18]. Although parental role was not identified as the most stressful factor in our study, these results underscore the importance of clinical-related stressors as major contributors to parental distress.

The DASS-42 Stress subscale showed a strong correlation with the Images and/or Sounds Dimension ($r = .643$, $p < .001$). This highlights the critical role of the physical environment as a psychosocial risk factor. Continuous noise, bright lighting, constant staff activity, and the presence of medical equipment may act as direct triggers of stress responses in parents. In agreement with this, Alzawad et al. and Rodríguez-Rey et al. reported that the hospital environment is one of the most influential factors on parental emotional responses [19,20]. Peng et al. also emphasized that, beyond the environment itself, uncertainty regarding the child's prognosis significantly contributes to parental hypervigilance and acute stress [21]. In this regard, Scott et al. described the Creating Opportunities for Parent Empowerment (COPE) program as an effective intervention, demonstrating reductions in parental stress, improved coping, and increased parental engagement in the care of their child [9].

Another important finding was the significant correlation between Anxiety and the Clinical Dimension ($r = .633$, $p < .001$). This result underlines that the perception of illness severity and exposure to invasive procedures are key drivers of anxiety symptoms. Recent meta-analyses further support this interpretation, confirming that parental psychological distress—including anxiety and depression—is intrinsically linked to illness severity and peri-traumatic stressors [2,3].

The inferential analysis allowed us to identify several sociodemographic and clinical factors that modulate stress and distress levels, thereby helping to define vulnerable subgroups. Woolgar et al. highlighted that a considerable proportion of parents are at risk of depression and/or PTSD following their child's PICU discharge, with psychosocial factors playing a critical role in this vulnerability. They recommend the use of screening tools such as the Posttraumatic Adjustment Screen (PAS) to identify at-risk parents early and to implement tailored support interventions [22].

When analyzing sociodemographic variables, several key aspects emerged:

Gender differences: Our findings showed that fathers reported significantly higher stress levels in the Emotional Dimension ($p = .040$). This is particularly relevant, as most research traditionally focuses on mothers, who generally report higher emotional distress. For example, Grandjean et al. found that mothers experience greater emotional impact than fathers [23]. However, recent studies suggest that while fathers may externalize stress differently or report fewer depressive symptoms, their overall stress levels and need for support are equally high [24,25]. This underscores the necessity of developing gender-sensitive support programs that address differences in coping strategies and emotional expression.

Prior PICU experience and knowledge: Parents without prior PICU experience reported significantly higher stress levels in the Clinical Dimension ($p = .049$) and Procedures and Interventions ($p = .021$). Lack of familiarity with the clinical environment and procedures increases perceptions of threat and loss of control, a finding supported by Meyers et al. [26]. These results reinforce the importance of early psychoeducational interventions and effective communication by the healthcare team to reduce uncertainty and demystify the PICU environment [9].

Socioeconomic impact and social support: Parents with lower income (<€1000/month) and those reporting limited social support experienced significantly higher emotional stress ($p = .030$ and $p =$

 doi:10.20944/preprints202510.2140.v1

.006, respectively). This aligns with existing literature documenting how low socioeconomic status and limited social support exacerbate parental psychological vulnerability [11,27]. Socioeconomic disparities in pediatric critical care represent a growing concern, as financial and social resource limitations may hinder coping abilities and access to follow-up care [28].

The high prevalence of stress, anxiety, and depressive symptoms observed in our sample suggests a considerable risk of developing PTSD in the medium to long term. Chu et al. reported in their meta-analysis that PTSD presents a significantly high prevalence among parents of critically ill children, stressing the importance of psychological counseling and social support to mitigate this risk [4,16].

The strong correlations observed between stress, anxiety, and environmental or clinical stressors have direct implications for PTSD prevention. The intensity of peri-traumatic stressors—such as distressing images or feelings of helplessness—represents a key risk factor for PTSD development [12,29]. Therefore, interventions should not only address parental emotional states but also actively reduce environmental stressors and enhance healthcare team communication [9,30].

At present, parents identified as experiencing significant emotional burden are referred to the hospital's psychology unit to receive appropriate care and support. Building on the findings of this study, the next step will be to implement a parental education program and early risk identification strategies to detect parents more likely to develop maladaptive emotional responses over time. This preventive approach aims to reduce stress, anxiety, and their potential long-term consequences.

Finally, some limitations should be acknowledged. Language barriers were the main challenge encountered, with some participants requiring assistance to complete the survey due to reading difficulties. To increase the external validity of these results, future research should aim to recruit a larger sample size and adopt a multicenter design.

5. Conclusions

In conclusion, this study confirms that parental stress in the PICU is a complex phenomenon modulated by multiple factors. Among these, sociodemographic variables and the overall clinical dimension exert the greatest influence. The identification of vulnerable subgroups—such as fathers, parents without prior PICU experience, those with low income, and those with limited social support—allows psychosocial resources to be directed more effectively. Prioritizing the reduction of environmental stressors and implementing early interventions may decrease the risk of adverse outcomes such as PTSD and facilitate better emotional adjustment during the hospitalization process.

Based on these results, the development of structured prevention programs should be considered, integrating parental education, early screening tools, and gender-sensitive approaches to provide tailored support. From a clinical perspective, interventions should not only address psychological distress but also target modifiable environmental factors and enhance communication between healthcare professionals and families.

Future research should expand these findings through larger and multicenter studies, in order to improve external validity and assess the effectiveness of targeted psychosocial interventions in mitigating parental distress and improving long-term outcomes.

Author Contributions: GDA: Methodology, Formal Analysis, Data Curation. JLDA: Conceptualization, Project Administration, Writing – Review & Editing. GGP: Investigation, Resources, Writing – Original Draft Preparation. JDPR: Conceptualization, Validation, Supervision, Writing – Review & Editing.

Funding: This research received no external funding

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the University of Murcia (protocol code CE092102, approval date 24 September 2021). In addition, authorization was obtained from the Hospital Clínico Universitario Virgen de la Arrixaca (Murcia, Spain) to carry out the research (reference number 457, approved in December 2020).

 doi:10.20944/preprints202510.2140.v1

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Participation was voluntary, and anonymity and confidentiality of responses were guaranteed throughout the research process.

Data Availability Statement: The data supporting the findings of this study are available from the corresponding author upon reasonable request. Due to privacy and ethical restrictions, the datasets are not publicly available.

Acknowledgments: The authors would like to express their sincere gratitude to the staff of the Pediatric Intensive Care Unit, the Hospital Clínico Universitario Virgen de la Arrixaca, and the Catholic University of Murcia for their support in carrying out this study. Most importantly, we thank all the participating parents for their valuable time and willingness to contribute anonymously to this research.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Abbreviations

The following abbreviations are used in this manuscript:

PICU — Pediatric Intensive Care Unit
PTSD — Post-Traumatic Stress Disorder
PSSIH — Parental Stressor Scale: Infant Hospitalization
DASS-42 — Depression, Anxiety, and Stress Scale (42 items)
COPE — Creating Opportunities for Parent Empowerment

References

1. Alvarado Romero HR, Rodríguez Colmenares SM. Necesidades percibidas de atención por niños, cuidadores y enfermeros durante la hospitalización en una unidad de cuidado intensivo. *Investig. Enferm. Imagen Desarr.* 2015;17(1):113-130. doi:10.11144/Javeriana.IE17-1.npan
2. Ko MSM, Lee WK, Sultana R, Murphy B, Heng KYC, et al. Psychological Outcomes in Families of PICU Survivors: A Meta-analysis. *Pediatrics.* 2024;154(1):e2023064210. doi:10.1542/peds.2023-064210
3. Alzawad Z, Weiss JM, Lee J, Perkhounkova Y, et al. Exploring factors affecting parental psychological vulnerability during their child's PICU admission: A prospective pilot cohort study. *J. Pediatr. Health Care.* 2024;38(3):323-336. doi:10.1016/j.pedhc.2023.10.011
4. Board R, Ryan-Wenger N. Long-term effects of pediatric intensive care unit hospitalization on families with young children. *Heart Lung.* 2002;31(1):53-66. doi:10.1067/mhl.2002.121246
5. Folkman S, Lazarus RS. Stress, Appraisal, and Coping. New York: Springer; 1984.
6. Rosenberg AR, Dussel V, Kang T, et al. Resilience and psychosocial outcomes in parents of critically ill children. J Pediatr Psychol. 2020;45(6):653-662. doi:10.1093/jpepsy/jsaa028
7. Astudillo Araya A, Silva Pacheco P, Daza Sepúlveda J. Nivel de estrés en padres de niños hospitalizados en unidades críticas pediátricas y neonatales. *Cienc. Enferm.* 2019;25:18. doi:10.4067/S0717-95532019000100214
8. Ramírez M, Navarro S, Clavería C, Molina Y, Cox A. Estresores parentales en Unidad de Cuidados Intensivos Pediátricos. *Rev. Chil. Pediatr.* 2018;89(2):182-189. doi:10.4067/S0370-41062018000200182
9. Scott G, Dunn LM, Dow B, Kenardy J, et al. Interventions to Support Psychological Health Outcomes for Children and Families Experiencing Paediatric Intensive Care Unit (PICU) Admission: A Scoping Review. *Nurs Crit Care.* 2025;30(1):15-28. doi:10.1111/nicc.70057
10. Ramírez M, Pino P, Springmuller D, Clavería C. Estrés en padres de niños operados de cardiopatías congénitas. *Arch Argent Pediatr.* 2014;112(3):263-267. http://dx.doi.org/10.5546/aap.2014.263
11. Upadhyay V, Parashar Y. A study of parental stressors, financial issues as stress factor, and the coping strategies in the PICU. *Indian J Pediatr.* 2022;89(12):1199-1205. doi:10.1007/s12098-021-04003-0

 doi:10.20944/preprints202510.2140.v1

12. de Pellegars A, Cariou C, Le Floch M, et al. Risk factors of post-traumatic stress disorder after hospitalization in a pediatric intensive care unit: A systematic literature review. Eur Child Adolesc Psychiatry. 2024;33(9):2991-3001. doi:10.1007/s00787-023-02141-8
13. Carter MC, Miles MS. The Parental Stressor Scale: Pediatric Intensive Care Unit. *Matern Child Nurs J.* 1989;18(3):187-198.
14. Navarro-Tapia S, Ramírez M, Clavería C, Molina Y. Validación de "The Parental Stressor Scale Infant Hospitalization modificado, al español" en una unidad cuidados intensivos pediátricos. Rev. chil. pediatr. 2019;90(4):399-410. http://dx.doi.org/10.32641/rchped.v90i4.1020.
15. Lovibond PF, Lovibond SH. The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behav Res Ther.* 1995;33(3):335-343. doi:10.1016/0005-7967(94)00075-U
16. Chu X, Dai X, Yuan P, Qi G, Shi X. Epidemical trends and risk factors of PTSD in parents of critically ill children: Evidence from both meta-analysis and subgroup analysis. *J Affect Disord.* 2024;350:111-120. doi:10.1016/j.jad.2023.10.032
17. Debelić I, Mikolčić A, Tihomirović J, Barić I, Lendić Đ, Nikšić Ž, Šencaj B, Lovrić R. Stressful Experiences of Parents in the Paediatric Intensive Care Unit: Searching for the Most Intensive PICU Stressors. *Int J Environ Res Public Health.* 2022;19(18):11450. doi:10.3390/ijerph191811450
18. Bogetz J, Tringale C, Torkildson C, et al. Stress Among Parents of Children With Severe Neurological Impairment at the Time of PICU Admission and Discharge. *J Palliat Med.* 2024;27(1):108-115. doi:10.1089/jpm.2023.0683
19. Rodríguez-Rey R, Sánchez-Fuentes M, Rosales-Muradó P. Development of a screening measure of stress for parents of children admitted to a Paediatric Intensive Care Unit (PICU). *Intensive Crit Care Nurs.* 2016;37:1-8.
20. Alzawad Z, Lewis FM, Ngo LA, Thomas K. Exploratory model of parental stress during children's hospitalization in a paediatric intensive care unit. *Intensive Crit Care Nurs.* 2021;63:102970. doi:10.1016/j.iccn.2021.102970
21. Peng Y, Yang Y, Zhang Y, et al. The effect of disease uncertainty on stress perception in parents of children admitted to the pediatric intensive care unit: A cross-sectional study. *Front Pediatr.* 2025;13:12243151. doi:10.3389/fped.2025.12243151
22. Woolgar FA, Wilcoxon L, Pathan N, et al. Screening for factors influencing parental psychological vulnerability during a child's PICU admission. *Pediatr Crit Care Med.* 2022;23(4):e185-e192. doi:10.1097/PCC.0000000000002745
23. Grandjean C, Zych B, Grandjean C, et al. Psychosocial outcomes in mothers and fathers of chronic critically ill children during and after PICU stay. *Eur J Pediatr.* 2024;183(1):163-172. doi:10.1007/s44253-024-00027-4
24. O'Sullivan K, O'Connell C, O'Connor C, et al. Gender Differences in the Psychosocial Functioning of Parents of Children With Chronic Illness: A Systematic Review. *Front Psychol.* 2022;13:846238. doi:10.3389/fpsyg.2022.846238
25. Zych B, Grandjean C, Krawiec J, et al. Differences in parental stress in mothers and fathers of preterm infants: A prospective study. *Eur J Midwifery.* 2025;9(1):1-8. DOI: https://doi.org/10.18332/ejm/200552
26. Meyers M, O'Malley A, et al. Parental stress and coping during their child's PICU stay: A qualitative study. *J Pediatr Nurs.* 2023;70:e72-e80.
27. Mitchell HK, Reddy A, Perry MA, et al. Racial, ethnic, and socioeconomic disparities in paediatric critical care in the USA. *Lancet Child Adolesc Health.* 2021;5(10):736-745. doi:10.1016/S2352-4642(21)00151-0
28. Raimondi F, et al. Parental stress in the NICU: A systematic review and meta-analysis of risk factors and interventions. *J Perinatol.* 2024
29. Baalaaji ARM, et al. Decoding parental stress – Toward better healthcare. *J Pediatr Crit Care.* 2021;8(3):142-147. DOI:10.4103/jpcc.jpcc_34_21
30. Rosenberg LM, et al. Discharge Screening Predicts Persistent Parental Psychological Distress Following a Child's PICU Admission. *Children (Basel).* 2025;12(10):1321. doi:10.3390/children12101321

 doi:10.20944/preprints202510.2140.v1