



# Predicting Posttraumatic Growth in Mothers and Fathers of Critically Ill Children: A Longitudinal Study

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## Abstract

Research on parental psychological effects related to a child's critical illness has focused on studying negative outcomes, while the possibility of posttraumatic growth (PTG), defined as the perception of positive changes after a traumatic event, has been overlooked. This study explores the degree of parental PTG after a child's hospitalization in a pediatric intensive care unit (PICU) and the role of resilience, emotions, perceived severity of the child's condition and stress in predicting PTG. In the first 48 h after their child's discharge from a PICU,  $N = 196$  parents were assessed for resilience, emotions, perceived stress, and the degree to which they perceived their child's condition as severe. 6 months later  $N = 143$  parents were assessed PTG. 6 months post discharge, 37.1% of parents reported PTG at least to a medium degree. Path analyses with latent variables showed that the psychological variables assessed at discharge predicted between 20 and 21% of the total variance in PTG. Resilience affected PTG indirectly, through the bias of positive emotions. PTG is a frequent phenomenon. Psychological interventions aimed at encouraging parental PTG after a child's critical admission should focus on boosting resilience and positive emotions.

**Keywords** Resilience · Posttraumatic growth · Parents · Critically ill children · Parent stress · Parent emotions · Pediatric intensive care unit

The hospitalization of a child with a potentially life-threatening condition in a pediatric intensive care unit (PICU) is often a traumatic experience for parents. Over the past three decades, pediatric illness has been viewed through the lens of posttraumatic stress. This paradigm conceptualizes pediatric medical events as the cause of several psychological outcomes for patients and family members, ranging from minimal distress to Posttraumatic Stress Disorder (PTSD) (Picoraro, Womer, Kazak, & Feudtner, 2014). Consistently, there are several studies confirming the prevalence of PTSD in 20–30% of the parents after their child's critical hospitalization (Balluffi et al., 2004; Bronner et al., 2010; Colville

& Pierce, 2012). However, it is broadly assumed that people exposed to traumatic situations may also realize psychological benefits (Helgeson, Reynolds, & Tomich, 2006). This phenomenon, termed posttraumatic growth (PTG), is defined as the perception of positive psychological changes that results from a struggle through a potentially traumatic experience (Tedeschi & Calhoun, 1996). These changes may occur in three domains: the perception of self (e.g., feeling stronger), the interpersonal relationships (e.g., deepening of relationships) and the transcendental dimension (e.g., better understanding of spiritual matters) (Rodríguez-Rey, Alonso-Tapia, & Kassam-Adams, 2016).

Although PTG is a recognized phenomenon in the field of pediatric illness (Picoraro et al., 2014), to our knowledge, only one study (Colville & Cream, 2009) has explored parental PTG after a child's critical hospitalization, finding that 88% of parents reported a positive change to a great degree 4 months after their child's discharge from the PICU. Additionally, Barr (2011) found moderate levels of PTG in parents when assessed during the admission of their children in a Neonatal Intensive Care Unit (NICU). Thus, even though more evidence is needed,

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results to date show that parental PTG in this context seems to be a reality.

Complete pediatric psychosocial care should not merely seek to control adverse effects, it should also help patients and families to use their strengths and to realize benefits from their experiences, which evidences the importance of recognizing PTG in that context (Picoraro et al., 2014). However, in order to develop interventions to foster PTG in critical care settings, it is important to first study which psychological variables contribute to the prediction of parental PTG.

One of these variables is resilience, a complex construct for which different definitions have been proposed (Tusaie & Dyer, 2004; Windle, Bennett, & Noyes, 2011). It has been understood as the collection of protective traits that helps people cope with adversity (Connor & Davidson, 2003) and as the absence of psychopathology after traumatic events (Levine, Laufer, Stein, Hamama-Raz, & Solomon, 2009). Currently, the most accepted definition of resilience understands it as “the process of effectively negotiating, adapting to, or managing significant sources of stress or trauma” (Windle, The Resilience Network, 2010, p. 1). This definition is the closest to the original meaning of the word resilience, which originates from the Latin ‘resilire’ (to leap back). According to such definition, in the present study we will understand resilience as the ability to bounce back, resist difficulties or adapt to stress, and not as a stable personality trait or the mere absence of psychopathology (Bonanno, 2005; Luthar, 2006). According to such definition, an individual is considered resilient when is able to recover easily and quickly after difficult situations (Smith et al., 2008). In the present study, resilience will be measured as the parents’ perceived ability to recover from stress.

Regarding the relation between resilience and PTG, literature has yielded inconsistent results, which may be explained by the difficulties in defining resilience explained above. Studies which have considered resilience as a trait find that these variables are positively related (Wu, Zhang, Liu, Zhou, & Wei, 2015; Bensimon, 2012), while a study understanding resilience as the absence of PTSD found a negative association between resilience and PTG (Levine et al., 2009). Thus, it seems that resilience defined as a protective factor is positively related to PTG, while resilience understood as the absence of PTSD is negatively related to PTG. Studies considering resilience as a fast recovery path after an stressful experience have posited that the relation between resilience and PTG is negative because resilient people may be able to protect themselves when facing negative events, and thus they do not struggle to the same extent as do more traumatized individuals (Westphal & Bonanno, 2007), which can result in lower PTG (Janoff-Bulman, 2004). Nevertheless, the relation between resilience assessed

as one’s perceived ability to bounce back, and PTG has not been previously addressed.

The relation between resilience and PTG can be better explained by understanding the variables that mediate such relation. Evidence from literature suggests that the relation between resilience and PTG following a traumatic experience might be mediated by perceived emotions and stress during and immediately after the traumatic event (the peri-trauma period). Starting with the relation between resilience and emotions, resilience has been found to be related to positive emotions during taxing events (Fredrickson, Tugade, Waugh, & Larkin, 2003; Philippe, Lecours, & Beaulieu-Pelletier, 2009). While the effect of negative emotions has been less explored, the available evidence shows that resilient individuals tend to experience less negative emotions (Fredrickson et al., 2003). Regarding the effect of emotions on PTG, some studies suggest that PTG is only significantly related to positive affect but not to negative affect (Schroevers, Kraaij, & Garnefski, 2011; Yu et al., 2014), which is inconsistent with the findings of other studies that reported an inverse relationship between negative emotions and PTG (Ho, Chan, & Ho, 2004; Salo, Qouta, & Punamaki, 2005).

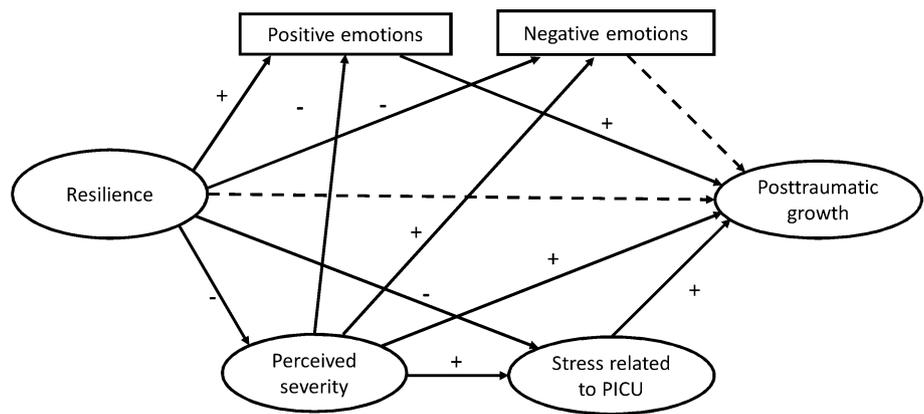
Concerning the relation between resilience and stress, people with higher resilience levels are presumed to face such situations with lower stress (Bonanno, Westphal, & Mancini, 2011), which may be influenced by the fact that they are less likely to perceive an event as traumatic. With regard to the effect of stress in PTG, literature affirms that for PTG to occur the event has to be perceived by the individual as the cause of considerable disruption to his/her assumptions about how the world operates, and how they fit into this world (Janoff-Bulman, 2004), suggesting a positive relation between stress and PTG.

Finally, the severity of the traumatic situation might influence PTG levels (Westphal & Bonanno, 2007); consequently, the present study will explore the association between the severity of the child’s condition during admission (objective and perceived by the parents) and the parental levels of PTG. In this line, studies agree that the subjective experience of the traumatic event is a more important determinant of mental health than the objective nature of the event itself (Kazak et al., 2006). Regarding the relation between perceived severity and PTG, for PTG to occur the event has to be perceived by the individual as traumatic enough to change their perceptions of the world’s functioning. Thus, events perceived as more extreme might produce more positive change than less extreme events (Janoff-Bulman, 2004; Tedeschi & Calhoun, 1996).

Based on the literature above described, the hypotheses of this study are as follows (Fig. 1):

1. Parental resilience will be positively related to the degree in which parents experience positive emotions

**Fig. 1** Hypothetic model of the relationships between resilience and PTG including the mediating variables negative emotions, positive emotions, perceived severity, and stress



during their child's critical hospitalization, and negatively related to the degree in which they perceive their child's condition as severe and experience negative emotions and stress during their child's admission.

2. Parental perception of their child's severity during the PICU admission will be negatively related to the degree in which they feel positive emotions, and positively related to their levels of negative emotions and perceived stress during admission.
3. Positive emotions experienced during admission will be positively related to PTG 6 months after hospital discharge.
4. The relation between negative emotions experienced during admission and PTG 6 months after hospital discharge will be either negative or inexistent (represented with a dotted line).
5. Perceived severity of the child's condition during the PICU hospitalization and perceived stress related to the PICU hospitalization will be positively associated to PTG 6 months after hospital discharge.

## Methods and Materials

Ethical permission for this longitudinal cohort study was granted by the Research Ethics Committee of the Hospital where data were collected. Written informed consent was obtained.

### Participants

Participants were parents whose child had been discharged in the last 48 h from a 16-bed PICU located in a tertiary hospital in Madrid, Spain. Exclusion criteria included being admitted for less than 12 h and not speaking Spanish well enough to complete the questionnaires. A total of  $n = 273$  parents were approached. Of them,  $n = 196$  (71.79%) parents of 130 children gave their consent and completed the questionnaires without missing data. Of participants 61.2% were

women. Their mean age was 37.80 years ( $SD = 6.58$ ) for the parents and 56.58 months ( $SD = 61.92$ ) for the children. A total of  $n = 143$  parents (73%) of 99 children completed the follow-up measure 6 months post discharge. Parents who only completed the baseline measure were not significantly different from parents who completed the 6-month follow-up measure in terms of gender, age of the parent, and age for the child (see Table 1).

### Procedure

The parents of every child admitted to the PICU for more than 12 h were approached by a trained researcher in psychology within 48 h of the child's discharge from the PICU. They were given an informed consent form that described the study and its purposes, potential risk and benefits, and limits of confidentiality. Informed consent was obtained from all individual participants included in the study. Those who consented to participate were given a set of questionnaires, which included the Abbreviated Parental Stressor Scale for Pediatric Intensive Care Unit (Rodríguez-Rey & Alonso-Tapia, 2016), the Brief Resilience Scale (Smith et al., 2008), the modified Differential Emotions Scale (Fredrickson et al., 2003), and two questions to assess perceived severity of the child's condition. Additionally, some patient medical data were obtained from patient record. 6 months later, participants were asked to complete the Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996) by post, e-mail, or telephone. All data were collected between January 2013 and March 2014.

### Instruments

#### Abbreviated Parental Stressor Scale for Pediatric Intensive Care Unit (A-PSS:PICU) (Rodríguez-Rey & Alonso-Tapia, 2016)

This scale, based on the PSS:PICU (Carter & Miles, 1989), includes seven items to assess parental stress caused by the

**Table 1** Differences between parents who completed only the baseline measure ( $N=53$ ) and parents who completed the 6-month follow-up ( $N=143$ ) (Student's  $t$  test for continuous variables and Chi-Square test for categorical variables)

	Parents who completed only T0	Parents who completed the whole study	$p$ of the dif.
Age parent, $M$ (SD)	36.60 (7.17)	38.24 (6.31)	.123
Sex of the parent			
Men	24	52	.322
Women	29	91	
Age child in months, $M$ (SD)	45.92 (61.53)	58.12 (61.13)	.217
Length of PICU admission in days, $M$ (SD)	6.42 (61.53)	6.31 (61.13)	.948
Perceived severity of child's condition, $M$ (SD)	4.47 (2.11)	4.08 (1.97)	.223
Objective severity of child's condition (PIM2), $M$ (SD)	4.53 (8.09)	6.01 (9.99)	.223
Elective versus emergency admission			
Elective	36	112	.133
Emergency	17	31	
Perceived stress (A-PSS:PICU), $M$ (SD)	21.58 (8.01)	20.59 (7.26)	.407
Positive emotions (mDES), $M$ (SD)	22.43 (6.97)	23.63 (6.85)	.282
Negative emotions (mDES), $M$ (SD)	12.04 (7.03)	9.88 (6.14)	.037
Resilience (BRS), $M$ (SD)	17.29 (4.94)	19.33 (4.88)	.011

PICU environment on a five-point Likert scale. It includes seven environmental stressors of the PICU (physical appearance of the child, sounds, medical procedures conducted on the child, separation from the child, seeing the child suffering or in pain, inadequate staff behavior and communication problems with physicians) and ask parents to rate in which degree each stimulus has been stressful for them during their child's admission to PICU. It has two factors; stress due to child's condition and stress related to PICU's staff. Both factors have shown adequate internal consistency in previous studies ( $\alpha=0.80$  for both factors) (Rodríguez-Rey & Alonso-Tapia, 2016) and in the present study ( $\alpha=0.79$  for factor 1 and  $\alpha=0.78$  for factor 2).

#### Brief Resilience Scale (BRS) (Smith et al., 2008)

It is designed to assess resilience as the ability to bounce back or to recover from stress. It is a six-item self-report scale rated on a five-point Likert scale (e.g., "I tend to bounce back quickly after hard times"). Scores are calculated as the sum of the item responses, after recoding its three inverse items. The scores may range from 0 to 30, with higher scores indicating higher resilience. The BRS has shown adequate internal consistency ( $\alpha=0.80-0.90$ ) and test-retest reliability ( $r=.62-.69$ ) in different previous studies and has been recommended based on its psychometric properties (Windle et al., 2011). The Spanish BRS showed adequate internal consistency ( $\alpha=0.83$ ) and test-retest reliability ( $ICC=0.69$ ) (Rodríguez-Rey, Alonso-Tapia, & Hernansaiz-Garrido, 2016). Internal consistency of this scale in the sample of this study was  $\alpha=0.85$ .

#### Medical Variable During the PICU Admission

Medical variable during the PICU admission was obtained from patient records and included the following: reason for admission, whether the admission was elective or not, length of the admission (in days), diagnosis and illness severity as measured by the Paediatric Index of Mortality 2 (PIM2), an index that informs about the child's mortality risk during the first 24 h of admission (Slater, Shann, & Pearson, 2003).

#### Modified Differential Emotions Scale (mDES) (Fredrickson et al., 2003)

This scale measures the degree to which people report using positive and negative emotions in relation to coping with a particular situation. It includes two 10-item subscales; one assessing positive emotions (amusement, wonder, gratitude, hope, inspiration, interest, happiness, love, pride, quietness) and the other assessing negative emotions (anger, shame, contempt, disgust, guilt, hate, sadness, fear, stress, embarrassment). In the present study, respondents were asked about the frequency of their experience of each emotion during their child's hospitalization in the PICU (0 = 'not at all' to 4 = 'extremely'). Both scales yielded high internal consistency in previous studies ( $\alpha=0.82-0.94$ ) (Fredrickson et al., 2003). We used the Spanish version by Páez, Bobowik, Carrera, and Bosco (2011). In the present sample, both, the positive and the negative emotions subscales, showed adequate internal consistency ( $\alpha=0.82$  and  $\alpha=0.81$ , respectively).

## Perceived Severity of the Child's Condition During Admission to PICU

Parents were asked two questions: (1) "How severe do you think your child's condition was during the PICU's admission?" This question used a scale that ranged from 0 = lowest severity to 7 = highest severity, and (2) "Did you think that your child could die at any point in their admission?" This question used a yes/no response format.

## Posttraumatic Growth Inventory (PTGI) (Tedeschi & Calhoun, 1996)

It is the best-known measure to assess PTG and contains 21 items with a six-point Likert response format ranging from 0 ("I did not experience this change as a result of my crisis") to 5 ("I experienced this change to a very great degree as a result of my crisis"). It includes five domains: greater appreciation of life, improved interpersonal relationships, greater personal strength, recognition of new possibilities in one's life course, and spiritual growth. However, a previous study found that a three-factor model with a personal, an interpersonal, and a transpersonal dimension fits better to parents of children after a PICU admission (Rodríguez-Rey, Alonso-Tapia, & Kassam-Adams, 2016; Rodríguez-Rey, Alonso-Tapia, & Hernansaiz-Garrido, 2016). We will use the original five-factor solution in order to present the prevalence of PTG in mothers and fathers in order to make data comparable to those from previous studies using the PTGI, but the three-factor solution that has proved to fit better to that sample will be used to conduct the rest of the study analyses. Reliability of the Spanish version was high ( $\alpha=0.95$ ) (Weiss & Berger, 2006). We have used the European Spanish translation (Vázquez & Páez, 2010), which has shown adequate internal consistency in the sample of the present study ( $\alpha=0.96$ ). In order to be sure that parent responses referred to the experience of their child's critical hospitalization, instead of asking about responses "as a result of my crisis," we asked about responses "as a result of my child's admission to the PICU."

## Statistical Approach

First, descriptive statistics were used to characterize the sample characteristics and their PTG levels, ANOVA tests were conducted to explore differences in PTG according to the type of admission (elective or emergency) and the parent's gender. Second, to explore the associations between the main variables in the study (resilience, perceived stress, objective severity, perceived severity, length of admission to the PICU, positive emotions, negative emotions and PTG), we calculated the zero-order correlations between these variables.

Third, to study which factors predicted PTG, we conducted a Path Analyses with Latent Variables (PALV). The PALV will test the model described in Fig. 1 with the purpose of studying the degree to which the data in the study fit the hypothesized model. A good fit would mean does not imply causal relationships but proves that results are compatible with the model tested. The model will be first tested only in women ( $n=91$ ) to avoid dependency in the data, and then in the total sample ( $N=143$ ) to explore whether the model works equally when all parents are included. In order to assess model-fit, absolute fit indexes ( $\chi^2$ ,  $\chi^2/df$ , GFI, SRMR), relative fit indexes (IFI), and non-centrality fit indexes (CFI, RMSEA) were used (Hair, Black, Babin, & Anderson, 2010). GFI, CFI, and TLI values of 0.90 or greater indicate an acceptable fit, while a value of 0.95 or greater indicates a good fit (Hu & Bentler, 1999). RMSEA and SRMR values between 0.05 and 0.08 represent an acceptable fit, whereas values lower than 0.05 indicate a good fit (McDonald & Ho, 2002).

Missing data in the present study were substituted by central item score. This happened in less than 5% of subjects including the two timepoints. Participants who omitted more than 2 items per questionnaire or 5 items when considering all questionnaires were eliminated from the study ( $N=6$ ). The statistical analyses were performed with the SPSS 24.0 and the Amos Graphics 24.0 programs.

## Results

### Sample Descriptive Data

The primary reasons for admission were planned surgery (65.3%), emergency medical treatment (16.8%), accidental injury and emergency surgery (11.1%), and relapse of a chronic disease (6.6%). Regarding diagnosis, 26.2% suffered from heart diseases, 16.2% from cancer, and 12.3% from respiratory conditions. The remaining 45.3% suffered from a variety of conditions such as osseous or neuromuscular defects (10%) or peritonitis (6.9%). A percentage of 78.3% of the admissions were elective. The average length of admission was 6.02 days ( $SD=0.1$ ). As shown in Table 1, parents who only completed the baseline assessment ( $N=53$ ) showed significant differences with parents who completed the six-months follow-up ( $N=143$ ) only in their levels of resilience and negative emotions, in the sense that parents who only completed the first measure showed lower resilience levels and higher levels of negative emotions.

### Descriptive Data of Posttraumatic Growth

The mean PTGI total score was 47.40 ( $SD=26.74$ ). Table 2 shows the breakdown of the total sample, mothers, and

**Table 2** Percent of sample endorsing posttraumatic growth (PTG) in the total PTGI and in the five dimensions of the PTGI at least in a medium degree

	All parents ( <i>N</i> = 143)	Mothers ( <i>N</i> = 91)	Fathers ( <i>N</i> = 52)
Total growth	37.1	40	25
Appreciation for life	54.5	62.6	40.4
Personal strength	46.2	54.9	30.6
Relating to others	40.6	48.4	26.8
New possibilities	29.4	35.2	19.2
Spiritual change	25.9	29.7	19.2

At least to a medium degree means that the average score is  $\geq 3$  PGI posttraumatic growth inventory

**Table 3** ANOVAs to study gender comparisons in PTG (total score and its dimensions)

	Mothers ( <i>N</i> = 44) <i>M</i> (SD)	Fathers ( <i>N</i> = 44) <i>M</i> (SD)	<i>F</i>	<i>p</i>
Total growth	49.39 (25.44)	39.59 (27.52)	2.95	.089
Appreciation for life	8.75 (4.46)	7.25 (4.53)	2.45	.122
Personal strength	10.50 (5.48)	7.75 (6.18)	4.88	.030
Relating to others	14.31 (10.16)	17.38 (9.58)	2.12	.149
New possibilities	9.59 (6.86)	8.02 (6.59)	1.20	.277
Spiritual change	2.25 (2.97)	3.15 (3.38)	1.79	.184

Gender comparisons were restricted to those parents where both mother and father supplied data (*N* = 88, 44 mothers and 44 fathers) PGI posttraumatic growth

fathers who demonstrated PTG at least in a medium degree for the total scale and each of the five original dimensions of the PTGI.

Table 3 shows the gender comparisons in PTG total score and its five dimensions as measured by the PTGI. Gender comparisons were restricted to those parents where both

mother and father supplied data (*N* = 88). Mothers and fathers did not show significant differences in their PTG total levels, though they fell short of it ( $p = .089$ ). Mothers showed high scores in personal strength than fathers ( $p = .03$ ).

With the purpose of knowing the percentage of the sample who experienced significant growth, we calculated the number of parents who obtained mean scores of at least 3 (“I have experienced this change in a medium degree”) in the PTGI total score and in each of its the three dimensions that emerged from the study by Rodríguez-Rey, Alonso-Tapia, & Kassam-Adams (2016) and Rodríguez-Rey, Alonso-Tapia, & Hernansaiz-Garrido (2016): interpersonal growth, personal growth and transpersonal growth. According to this criterion, 53 parents (37.1%) indicated that they had experienced positive change at least to a medium degree. Regarding the three PTG dimensions, 78 parents (54.5%) perceived at least medium levels of “interpersonal growth,” 64 parents (44.8%) perceived at least medium levels of “personal growth” and 30 parents (21%) perceived at least medium levels of “transpersonal growth.” To make our data comparable to those of Colville and Cream (2009), we also calculated how many parents indicated that they had experienced positive change to a “great” or “very great” degree (scores  $\geq 4$ ) in at least one of the 21 items of the PTGI, and 119 parents (83.2%) indicated so.

### Correlations Between the Study Variables

Table 4 shows the zero-order correlations between resilience, perceived severity, objective severity, length of PICU admission (in days), perceived stress, positive emotions, negative emotions, and PTG.

Resilience is unrelated to objective severity, perceived severity and PTG, negatively related to perceived stress and negative emotions and positively related to positive emotions. Objective severity is related to perceived severity and length of admission, but unrelated to the rest of the study

**Table 4** Zero-order correlations between resilience, perceived severity, objective severity, length of PICU admission (in days), perceived stress, positive emotions, negative emotions, and PTG

	Perceived severity	Objective severity	Length of admission	Perceived stress	Positive emotions	Negative emotions	PTG
Resilience	−0.045	−0.019	−0.019	−0.384***	0.350***	−0.439***	−0.092
Perceived severity		0.363***	0.304***	0.305***	−0.096	0.293***	0.207*
Objective severity			0.537***	0.158	0.057	0.163	0.060
Length of admission				0.189*	−0.041	0.273***	0.119
Perceived stress					−0.249**	0.408***	0.218**
Positive emotions						−0.289***	0.202*
Negative emotions							0.118

\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$

variables. Length of admission is also related to perceived severity, negative emotions and stress, and unrelated to resilience, positive emotions and PTG. Perceived severity was positively associated to perceived stress, negative emotions, and PTG. Finally, positive emotions were positively correlated to PTG, while negative emotions were uncorrelated to PTG.

### ANOVA Tests by Type of Admission (Elective Versus Emergency Admissions)

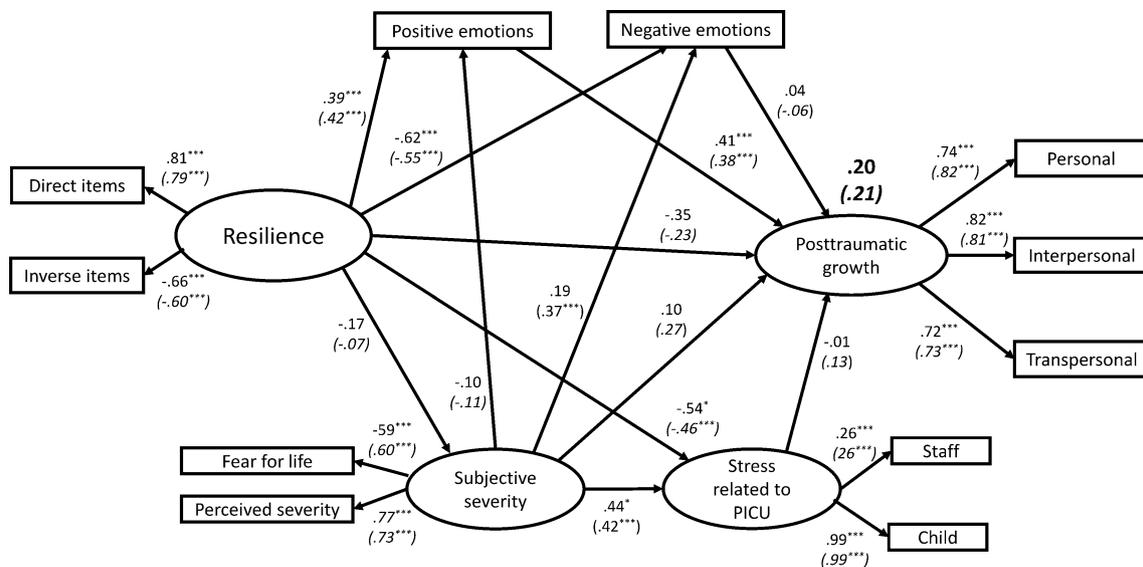
We conducted ANOVA tests to account for differences on self-reported resilience, positive emotions, negative emotions, perceived stress, perceived severity of the child’s condition, and PTG by type of admission (elective versus emergency). These ANOVAs showed that when the admission has been arranged in advance (elective) parents showed lower levels of negative emotions (mean emergency admissions = 12.74; SD = 5.90; mean elective admissions = 9.09; SD = 6;  $F = 9.07$ ;  $p = .003$ ) and perceived their child’s condition as less severe (mean emergency admissions = 5.03; SD = 1.72; mean elective admissions = 3.81; SD = 1.96;

$F = 9.91$ ;  $p = .002$ ). PTG levels 6 months post discharge did not show significant differences when parents whose children had an elective admission were compared with parents whose children had emergency admissions ( $p = .224$ ).

### Prediction of Posttraumatic Growth

Figure 2 shows the standardized estimates of the model tested in the sample of women ( $n = 91$ ) and in the whole sample of parents ( $N = 143$ ). As shown in Table 5, all the fit statistics for the model conducted only with mothers were well inside the limits for the model to be accepted, as the Chi-square statistic was not significant, the GFI ( $> 0.90$ ) and the SRMR ( $< 0.08$ ) were acceptable, and the GFI and the IFI were good (both  $> 0.95$ ). As for the fit indices of the model conducted on the whole sample of parents all the fit indices were good (see Table 5).

As shown in Fig. 2, the model predicts 20% of the variance of PTG in the model conducted on mothers, and 21% in the model conducted with all the parents of the sample. In terms of the significant associations between the study variables, the PALV conducted on mothers was very similar to



**Fig. 2** Predictive model of parental PTG from resilience, perceived severity, positive emotions, negative emotions, and stress related to the PICU stimuli. Note: The upper standardized estimates refer to the

sample of mothers ( $n = 91$ ). The standardized estimates on the bottom and written in brackets and in italics refer to the sample of all parents ( $N = 143$ ). \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$

**Table 5** Goodness of fit for the path analyses with latent variables (PALV)

	<i>n</i>	$\chi^2/df$	<i>p</i>	GFI	IFI	CFI	RMSEA	SRMR
PALV 1								
Women	91	1.24	.16	0.93	0.97	0.96	0.05	0.06
All sample	143	1.23	.17	0.95	0.98	0.98	0.04	0.04

GFI goodness of fit index, IFI incremental fit index, CFI comparative fit index, RMSEA root mean square error of approximation, SRMR standardized root mean square residual

the one conducted on the whole sample, the only difference being the relation between perceived severity and negative emotions, which was not significant for mothers, but significant for the whole sample (see Fig. 2).

Coherently with the first hypothesis, parental resilience was positively and significantly related to the degree in which parents experienced positive emotions during their child's critical hospitalization. Besides, resilience was inversely related with negative emotions and with stress during their child's admission. However, contrary to the study hypothesis, resilience was not significantly related to the degree in which parents perceived their child's condition as severe.

As for the second hypothesis, it was expected that the relation between parental perception of their child's severity during the PICU admission would be negatively related to the degree in which they feel positive emotions. Results showed that such relation was not significant. It was also expected that perceived severity would be positively related to their levels of negative emotions, what occurred only in the case of the whole sample, but not in mothers. Finally, as expected, perceived severity was positively related to the degree of stress during admission.

Results support the third hypothesis, as positive emotions experienced during admission were positively related to PTG 6 months after hospital discharge. Likewise, according to the fourth hypothesis, the relation between negative emotions experienced during admission and PTG 6 months after the child's discharge from the PICU were not significant. Finally, contrary to the fifth hypothesis, perceived severity of the child's condition during the PICU hospitalization and perceived stress related to the PICU hospitalization were not significantly associated to PTG 6 months after hospital discharge.

The direct relation between resilience and PTG was not significant, though it had a significant indirect effect through the bias of positive emotions (0.130 for the model conducted on mothers, and 0.110 for the model conducted on all parents of the study). That is, due to the indirect (mediated) effect of resilience on PTG, when resilience goes up by 1 standard deviation, PTG goes up by 0.13 standard deviations in mothers and 0.11 in the sample of all parents.

## Discussion

The current study sought to explore the level of PTG in parents following the admission of their child in a PICU, and to study the degree to which resilience, emotions, perceived severity of the child's condition during the PICU hospitalization, and stress caused by the context of the PICU contributed to predict PTG. According to our results, 37.1% of parents reported at least medium levels of PTG 6 months

after their child's discharge from the PICU. The mean in the PTGI (47.40) was very similar to the one found in the previous study conducted in intensive care (49.0), as well as the percentage of parents who showed growth to a great degree in at least one of the items of the PTGI (Colville & Cream, 2009). Consequently, our results confirm the idea that PTG is a relevant outcome for parents after their child's admission to a PICU. Contrary to previous studies (Helgeson et al., 2006), women and men reported equivalent PTG total scores, although women showed higher scores in the dimension personal strength. Our findings evidenced the protective effect of resilience assessed as the ability to bounce back after significant adversity. Resilient individuals cope better with their child's critical illness, as they perceive the PICU stimuli as less stressful and experience less negative emotions, such as guilt or hate, and more positive emotions, such as love or gratitude, during admission. Contrary to our expectations, resilience did not influence parent's perceptions of their child's severity. Thus, this variable might be dependent on other factors, such as personality characteristics (e.g., optimism), and is also related to objective severity.

Although a high level of resilience benefits parental outcomes during admission in terms of emotions and stress, resilience does not have a significant direct impact on the level of PTG that parents experience 6 months post discharge. Also, parental perceived severity of the child's condition and negative emotions did not significantly contribute to predict PTG. Thus, our study shows that resilient individuals do not struggle to the same extent as do more traumatized individuals (Westphal & Bonanno, 2007); however, this fact does not directly impact their PTG levels.

Even though resilience does not directly impact PTG, the most relevant finding of our study is the conjoint effect of parental resilience and positive emotions in predicting PTG. The degree of positive emotions experienced during admission was the only variable directly related to PTG. However, it was related to resilience. Thus, as expected, parents scoring higher in resilience experienced more positive emotions (Philippe et al., 2009), which was related to higher PTG. This finding supports data that emerged from the literature (Fredrickson et al., 2003; Schroevers et al., 2011). The influence of positive emotions on PTG may be explained by the broaden-and-build-theory (Fredrickson, 2000; Fredrickson et al., 2003), which posits that positive emotions broaden habitual modes of thinking or acting, which can lead to a perceived growth that persists over time.

The possibility of PTG after having a child hospitalized in intensive care has important clinical implications for intervention. However, the dearth of previous research on positive responses to medical trauma among parents hampers our capacity to make specific recommendations to pediatric caregivers seeking to promote PTG. Nevertheless, our model provides some clues. First, it evidences that, for parents,

the experience of a child's critical admission is not fully negative, so the presence of positive post-trauma reactions should be recognized and normalized. Also, the present study suggests that parents could benefit from interventions that could enhance their positive emotions during the critical hospitalization. This leads to the question of how to cultivate positive emotions in crises, knowing that they cannot be instilled directly (Fredrickson, 2000). As our study suggests, promoting parental resilience might be a path to increase the degree in which they experience positive emotions during admission. Coherently with previous research, resilience might be enhanced by promoting the use of certain adaptive coping strategies, such as positive thinking (Alonso-Tapia, Rodríguez-Rey, Garrido-Hernansaiz, Nieto, & Ruiz, 2016). This is consistent with findings from previous studies which have suggested that finding positive meaning may be the most powerful coping strategy for fostering positive emotions in crises (Fredrickson et al., 2003). Such interventions would let us move from a pathogenic model, aimed at preventing and treating psychopathology, to a model in which the strength and resources of the individual are recognized and promoted.

We are aware that our study has several limitations, the main one being that it relies exclusively on self-report data to assess PTG, even though the validity of such a method has been questioned (Sumalla, Ochoa, & Blanco, 2009). Future research could overcome this limitation by incorporating objective behavioral changes and utilizing additional reporters (e.g., family) to the PTG assessment. Even though our data show that the model is very similar when tested in mothers, and when tested in the whole sample of parents, there is evidence of a relation which is different; the association between perceived severity and negative emotions was only significant in the model tested on all parents. This is indicative of a difference between mothers and fathers. However, the sample size of fathers was not enough to conduct an additional PALV on this group, as we have done in mothers. Future studies should include a larger sample of fathers, which will make possible to conduct multiple group analyses to explore whether any of the relations in the model works differently with fathers than it does with mothers. Besides, parents who only completed the baseline measure showed significantly lower levels of resilience and higher levels of negative emotions than parents who also completed the 6-month assessment. Thus, it may seem that more psychologically impaired parents are more difficult to retain in the study, which may limit the generalizability of our results. Finally, resilience, emotions, perceived stress and severity of the child's condition were measured shortly after discharge and are potentially impacted by the success of the treatment and prognosis. It would be convenient, therefore, to measure these variables as soon as possible when the child is admitted to the PICU. Among its strengths, most previous research

has used cross-sectional designs, which could not determine the causality of the relations between PTG and its predictors (Wu et al., 2015). By using a longitudinal design, we have overcome that limitation. Furthermore, to date, most of the studies that have integrated different measures in a predictive model of PTG have used regression analyses (Yu et al., 2014). Using a confirmatory approach through structural equations modeling represents an advance in understanding the dependence of PTG on other psychological variables.

According to Picoraro et al. (2014), PTG following pediatric medical trauma does not only depend on pre- and peri-trauma variables, but also on cognitive and affective variables that come into play once the traumatic experience has ended. Thus, to better understand the mechanisms that lead to parental PTG after a child's critical illness, future research should incorporate into the predictive model of PTG the effect of variables that take place after the child's discharge from PICU. Finally, interventions to foster PTG by promoting resilience and positive emotions should be developed and tested, considering that, based on our results and on results from previous studies (Yu et al., 2014), increasing positive affect is the key for PTG promotion.

## Compliance with Ethical Standards

**Conflict of interest** Rocío Rodríguez-Rey and Jesús Alonso-Tapia declare that they have no conflict of interest.

**Human and Animal Rights and Informed Consent** All procedures were in accordance with the ethical standards of the institutional research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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