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## **Mothers' illness-related functioning predicts posttraumatic stress symptoms in survivors of childhood cancer**

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Review

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3 Mothers' illness-related functioning predicts posttraumatic stress symptoms in survivors of  
4 childhood cancer.  
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8 The aim of the present study was to investigate whether parental illness-related functioning is  
9 linked to Posttraumatic Stress Symptoms (PTSS), and how strongly it predicts the emergence of  
10 such symptoms among survivors of pediatric cancer. 90 mothers of pediatric cancer survivors  
11 reported on their children's oncological treatment, their children's PTSS and their own illness-  
12 related functioning, which was studied along three different dimensions: illness-related  
13 emotions and cognitions; responses towards the sick child; and PTSS in mothers. All  
14 dimensions of mothers' illness-related functioning showed strong correlations with survivors'  
15 PTSS. Moreover, mothers' illness-related functioning was more predictive of PTSS in survivors  
16 than objective aspects of treatment (i.e. duration or intensity). Mother's unregulated  
17 responses towards the sick child showed the strongest predictive value on survivors' PTSS.  
18 These findings shed light on specific parental emotions, cognitions and behaviors that may  
19 influence the patients' long-term psychological responses. A family-centered model of  
20 pediatric oncology nursing may be enriched by the consideration of these processes.  
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25 Keywords: childhood cancer; PTSS; PTSD; mothers  
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29 Childhood cancer is an increasingly prevalent condition that poses a psychological impact upon  
30 the child and her family across several levels. Besides the threat to health and to the child's  
31 life, changes in family routines, uncertainty, stress in siblings and other family members, are  
32 some of the stressors that need to be dealt with (Rolland, 1994). This makes childhood cancer  
33 a complex challenge, and may render it traumatic. Posttraumatic stress symptoms (PTSS) and  
34 posttraumatic stress disorder (PTSD) are two clinical constructs that have been widely used  
35 and discussed in the study of long-term responses to childhood cancer (see Bruce, 2006;  
36 Phipps, Jurbergs & Long, 2009). PTSD is a set of responses to the exposure to actual or  
37 threatened death, or serious physical injury, among other stressors. These responses include  
38 intrusion symptoms associated with the traumatic events (e.g. flashbacks), avoidance of  
39 stimuli associated to the trauma, alterations in cognition and moods (e.g. negative beliefs  
40 about oneself and others), and alterations in arousal and reactivity (e.g. hypervigilance) (DSM-  
41 5, 2013). Studies that measure PTSD among pediatric cancer survivors have found a prevalence  
42 that ranges from 4.7% (Kazak et al., 2004) to 21% (Butler, Rizzi & Hanberger, 1996). Also, a  
43 significant presence of PTSS among survivors (Currier, Jobe-Shields & Phipps, 2009), as well as  
44 parents (Landolt et al., 2012), has been reported. Interestingly, these studies consistently show  
45 that treatment intensity is not related to posttraumatic responses, as are other variables of a  
46 more psychological nature (see Bruce, 2006). Other objective aspects related to the treatment,  
47 such as duration, or time off treatment, have shown variable relations with PTSS across  
48 different studies (see Bruce, 2006).  
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55 Relational models of childhood PTSD suggest that children and caregivers may have impacts on  
56 each other. Caregivers may help their children cope with the trauma and post-traumatic  
57 emotions (Markese, 2011; Pynoos et al., 2009; Schechter & Davies, 2007), recover and  
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3 reprocess traumatic memories, and/or construct meaning for the traumatic experience  
4 (Salmon & Bryant, 2002). In this sense, Markese (2011) claims that

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6 “[.] the degree of threat to the parent, the parent’s reactions to the trauma, and the  
7 impact of the parent’s posttraumatic stress symptoms on the parent-child relationship,  
8 may be more important in the child’s functioning and mental health outcomes than the  
9 actual direct trauma exposure” (p. 343).

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12 Conversely, the long-term severity of caregivers’ trauma-related responses may be better  
13 predicted by their children’s responses than by their own short-term symptoms (Koplewicz et  
14 al. 2002; Scheeringa, Myers, Puntnam & Zeanah, 2015). These principles have been supported  
15 by research projects that found an association between parental and children’s posttraumatic  
16 responses after traumatic exposure of different kinds (Landolt, Ystrom, Sennhauser, Gnehm &  
17 Vollrath, 2012; Morris, Gabert-Quillen & Delahanty, 2012; Laor, Wolmer & Cohen, 2001;  
18 Lauterbach, Koch & Porter, 2007; Schechter & Davies, 2007; Scheeringa & Zeanah, 2001;  
19 Smith, Perrin, Yule & Rabe-Hesketh, 2001).

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22 This would mean that, for childhood cancer survivors, posttraumatic sequelae may be closely  
23 related to parents’ distress and reactions during treatment, something that seems to be  
24 indicated by clinical experience. However, the mechanisms that support this association  
25 remain unclear. We still do not know which specific illness-related behaviors, thoughts and  
26 emotions in parents may be related to PTSS in their children. We posit that three aspects of  
27 parental illness-related functioning may function as explanatory mechanisms of this link: 1.  
28 Parents’ negative emotions/cognitions concerning the illness; 2. Parents’ unregulated  
29 responses towards the sick child (such as extreme preoccupatin, overprotection, irritability,  
30 etc.); and 3. Parents’ posttraumatic symptoms (PTSS).

### 31 32 33 34 35 36 37 *Parental emotions/cognitions towards illness in the child*

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39 On the one hand, a cancer diagnosis in the child can confront parents with experiences of fear,  
40 helplessness, rage or guilt that need to be resolved. It also imposes the task of redefining the  
41 meaning of parenthood and of the parent-child relationship. In the context of disability, it has  
42 been shown that parental integration of the child’s diagnosis directly influences their ability to  
43 provide care (Marvin & Pianta, 1996; Pianta, Marvin, Britner & Borowitz, 1996). Feelings of  
44 chronic sorrow, rage, guilt or long-term uncertainty in parents have been studied separately  
45 (see Bonner et al., 2006) and together (Bonner, Hardy, Willard & Hutchinson, 2007; Bonner,  
46 Hardy, Willard, Hutchinson & Guill, 2008), with respect to diverse pediatric conditions, and  
47 have been found to be related to anticipatory grief, hopefulness and general functioning in  
48 parents (Bonner at al., 2008).

### 49 50 51 52 53 54 *Parental unregulated responses towards the sick child*

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56 On the other hand, parental illness-related responses towards the child during exposure  
57 (painful procedures, sedation, diagnostic interview, etc.), or in face of the child’s posttraumatic  
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3 re-experiencing after treatment, may modulate the impact of these stressors on the child. In  
4 the cases where parental illness-related responses are chronically unregulated, they may  
5 aggravate feelings of uncertainty and threat, promote dissociative or avoidant responses, or  
6 lead to emotional overwhelming in the child. Irritability, overprotection, emotional  
7 overwhelming, or intense sadness in parents of children with cancer, could compound or  
8 modulate the effect of the medical trauma on the child (Scheeringa & Zeanah, 2001).  
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### 10 11 *Parents' PTSS*

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13 Beside these two processes, parents' PTSS seem to be related to PTSS in children with cancer,  
14 as several studies show (see Bruce, 2005). Although parents' PTSS and unregulated responses  
15 are two closely related constructs and seem to overlap, there is an important difference in  
16 terms of what the child perceives. While PTSS involves a set of responses of internalizing  
17 nature (definición internalizing), unregulated responses are observable by the child and may  
18 have a direct impact on her. More importantly, these responses are always cued by the child's  
19 distress during treatment and, therefore, more closely related the experience of childhood  
20 cancer.  
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26 To our knowledge, the relationship between survivors' PTSS with parental negative  
27 emotions/cognitions, and parental unregulated responses related to illness has not been  
28 studied in a systematic fashion. Our interest for this study is to expand our knowledge on  
29 family aspects of childhood cancer in such direction. Therefore, we seek to answer the  
30 following questions. First, is parental illness-related functioning associated to PTSS in  
31 childhood cancer survivors, above several aspects of treatment (intensity, duration, time off  
32 treatment)? Second, which aspects of parental illness-related functioning are more strongly  
33 associated to PTSS in survivors?  
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37 We expect that parental-trauma related functioning has a significant relationship to PTSS in  
38 survivors of childhood cancer, above the impact of other aspects of the treatment experience  
39 (such as treatment intensity, treatment duration, and time off treatment).  
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### 42 43 **Method**

#### 44 45 **Participants and procedure**

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47 Our study was conducted on self-reports of 90 mothers of children and adolescents that have  
48 survived pediatric cancer. Surveys included measures of different aspects of treatment  
49 (treatment intensity, duration of treatment, and time off treatment), mothers' illness-related  
50 functioning and PTSS/**PTSD** in survivors. Participants were recruited from a general hospital, as  
51 well as from an association of families affected by pediatric cancer in Madrid (Spain). Ethical  
52 committees belonging to such institutions approved this study, and participants signed  
53 informed consents for the use of these data for publication. Our inclusion criteria required that  
54 patients were off treatment and that families were Spanish-speaking. Participants whose  
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3 children suffered from sequelae from their illness or treatment were excluded. Table 1  
4 contains descriptive statistics for demographic and treatment-related variables.  
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## 8 Measures

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10 *UCLA Posttraumatic Stress Disorder-Reaction Index* (Steinberg et al., 2004). This widely used  
11 instrument consists of 21 items that measure PTSS in children and adolescents, distributed  
12 along the three symptom clusters delineated in DSM-IV-TR (APA, 2000) (reexperiencing,  
13 avoidance/numbing and hyperarousal). It yields results on presence and intensity of PTSS, as  
14 well as on the probable presence of a diagnosis of PTSD. The parent version of this instrument  
15 for Spanish-speaking populations was used, with two modifications: 1. Several items were  
16 reworded to make them specific to childhood cancer. 2. A revised algorithm for the diagnosis  
17 of PTSD among preschool children, proposed and validated by Scheeringa et al. (1995, 2003)  
18 was used for the children aged 6 years or less. This algorithm modifies the clinical threshold of  
19 cluster C from three symptoms to one, among preschool children. It has been incorporated to  
20 the criteria of PTSD in the fifth edition of the Diagnostic and Statistical Manual of Mental  
21 Disorders (DSM-5, 2014). Cronbach's alpha for this instrument was 0.79.  
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26 *Impact of Events Scale* (IES-R, Weiss & Marmar, 1997). This measure consists of 22 items that  
27 assess PTSS in adults along the three clusters defined by DSM-IV-TR (APA, 2000). A validated  
28 Spanish version of the questionnaire (Báguena et al., 2001) was used to measure PTSS in  
29 mothers. Cronbach's alpha for this instrument was 0.94.  
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32 *Parent Experience of Child Illness* (PECI, Bonner et al., 2006). This instrument consists of 25  
33 items aimed at measuring parents' illness-related emotions, cognitions and adjustment to  
34 their child's illness. Items are distributed along four subscales: Guilt and worry; Unresolved  
35 sorrow and anger; Long-term uncertainty; and Emotional Resources. The first three subscales  
36 were used, since they tap into negative emotions and cognitions, which are of interest for our  
37 research. A reverse translation of the instrument to Spanish was done in order to use it on our  
38 sample. Cronbach's alpha for this instrument was 0.90.  
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42 *Parental Response Styles Questionnaire* (*Cuestionario de Estilos de Respuesta Parental*, CERP,  
43 Author Blinded, 2014). This is a measure of parental responses towards the child's illness-  
44 related distress. It was designed by the main authors of this study, partially based upon  
45 Scheeringa's Posttrauma Inventory of Parental Style (PIPS, Scheeringa, 2002). It includes 4  
46 dimensions of parental response: Irritability/rejection; Emotional overwhelming;  
47 Overprotection/indulgence; and Depressive affect. The sum of these four factors offers a  
48 general measure of Unregulated Illness-related Responses in parents. The Cronbach's alpha for  
49 this instrument was 0.88.  
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52 *Treatment intensity*. A checklist was designed by the authors of this study in order to gather  
53 information on intensity of treatment. It was completed by the survivors' mothers, and it  
54 included modalities of treatment undergone by the child, procedures involving pain or distress,  
55 side effects, etc. Cronbach's alpha for this instrument was 0.76.  
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### Data analysis

Correlational analyses were conducted in order to test the relationship between PTSS in survivors and the three aspects of parental illness-related response. A hierarchical regression analysis was conducted to identify the independent predictive value of each of the variables of interest on PTSS among pediatric cancer survivors. Assumptions of normality and homoscedasticity were tested successfully. No significant outliers, high leverage points or highly influential points were found.

### Results

Among pediatric cancer survivors, no significant relationships were found between age or sex and PTSS ( $r(90) = .03$ ;  $p = .78$ ) ( $t(90) = -.61$ ;  $p = .54$ ).

#### *Prevalence of PTSS/PTSD among childhood cancer survivors*

A total of 22 (24.4%) childhood cancer survivors showed symptoms suggestive of a PTSD diagnosis, according to their mothers' reports. The mean of PTSS was 16.78 (SD=12.84), within a range of 0-57.

#### *Correlations between survivors' PTSS and dimensions parental illness-related functioning*

As is shown on table 2, correlations between mothers' illness-related functioning and their children's posttraumatic stress symptoms (PTSS) were positive and significant. Mothers' who displayed unregulated responses (e.g. overprotection) towards the sick child reported high levels of posttraumatic symptomatology in their children after treatment. Moreover, mothers who felt persistent negative emotions (e.g. guilt) or who had negative cognitions (e.g. persistent uncertainty) reported higher levels of PTSS in their children. Finally, mothers who still suffered from PTSS related to their child's illness (e.g. recurring memories about treatment) also reported high levels of posttraumatic symptomatology in survivors. These relationships were especially strong for the following aspects of mothers' functioning: depressive affect; guilt and preoccupation; and unresolved sorrow and anger.

A significant, albeit milder correlation was also found between time off treatment and PTSS in survivors ( $r = -.22$ ;  $p < .001$ ). These indicates that posttraumatic symptomatology tends to decrease as months pass after the end of oncological treatment for survivors.

#### *Predictive model of PTSS among pediatric cancer survivors*

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3 Variables included in the model pertained to different aspects of treatment (duration of  
4 treatment, intensity of treatment, and time off treatment) and the three dimensions of  
5 parental illness-related functioning of interest (mothers' negative emotions and cognitions  
6 concerning their child's illness; mothers' unregulated responses; and mothers' PTSS). Age at  
7 diagnosis was also introduced in the model. Analysis of the correlation matrix revealed no  
8 evidence of multicollinearity (defined as a .90 correlation or greater) among the predictor  
9 variables (Tabachnick & Fidell, 2001). The strongest correlations found were those that have  
10 been reported above.  
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14 In Step 1, the analysis was done with treatment-related variables and age at diagnosis. In Step  
15 2, parental illness-related functioning variables were also included. The predictive model for  
16 PTSS among pediatric cancer survivors was found to be significantly different from zero at each  
17 of the two steps, and after step 2, with all variables entered ( $F(7, 90) = 15.88; p < .001$ ) (see  
18 Table 3). The adjusted  $R^2$  value indicated that 55% of the variability in PTSS was predicted by  
19 age at diagnosis, mothers' unregulated illness-related responses and mothers' non-resolution  
20 of experience. The comparison of the adjusted  $R^2$  values from Step 1 to Step 2 indicates that  
21 46% of predictive validity was gained by introducing parental illness-related factors in the  
22 model. This gain in predictive power was significant ( $F(3, 90) = 28.84; p < .001$ ). Mothers'  
23 unregulated responses was the strongest predictor of the model.  
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## 26 Discussion

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28 An integral model on the nurse's work within the context of pediatric oncology warrants  
29 knowledge on how family processes may either support or jeopardize the child's adaptation to  
30 her illness. This study aimed to investigate whether aspects of parental illness-related  
31 functioning were more related than aspects of medical treatment to PTSS among childhood  
32 cancer survivors. It also aimed to ascertain which aspects of parental illness-related  
33 functioning showed a stronger relationship with PTSS in survivors. This is one of the few  
34 studies that looks beyond parental PTSS and general indices of mental health, into specific  
35 parental illness-related responses that may be related to survivors' signs of distress during the  
36 course of illness and treatment. It does so in accordance to relational models of trauma in  
37 infancy and childhood (see Markese, 2011; Schechter & Davies, 2007; Scheeringa & Zeanah,  
38 2001; Stolorow, 2011). Thus, mother's negative emotions and cognitions related to the illness,  
39 and mothers' unregulated responses towards the sick child were explored for the first time.  
40 These two categories include inner representational processes (unresolved sorrow and anger,  
41 guilt and worry, and a sense of long-term uncertainty) as well as explicit, visible responses and  
42 attitudes (irritation, emotional overwhelming, overprotection and/or sadness).  
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48 Cancer survivors showed a 24.4% of symptoms suggestive of a PTSD diagnosis. This prevalence  
49 is higher than those reported in most of the studies conducted with this kind of population.  
50 Rates in other studies range from 4.7% (Kazak et al., 2004) to 21% (Butler, Rizzi & Handberger,  
51 1996), something that has led various authors (Phipps et al., 2009) to question the pertinence  
52 of the PTSD framework for the study of children's long-term responses to cancer. The  
53 significant number of survivors that showed symptoms suggestive of a PTSD diagnosis within  
54 our sample speaks against such argument. Such result may stem from the application of  
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3 Scheeringa et al's. (1995, 2003) modification of the threshold for cluster C among preschool-  
4 age children.

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6 Mother's negative emotions and cognitions related to the illness, and mothers' unregulated  
7 responses towards the sick child were related to survivors' PTSS in a significant way. Also, they  
8 functioned as predictors of PTSS in survivors, along with duration of treatment. More  
9 importantly, these aspects of parental illness-related functioning proved to be more strongly  
10 related to PTSS in survivors than other, more objective aspects of pediatric treatment such as  
11 intensity or duration of treatment, as was shown by the change in the R<sup>2</sup> value between steps  
12 1 and 2 of the regression analysis. Specifically, affects and responses related to depressive  
13 states in mothers (guilt, unresolved sorrow and anger, and depressive affect) were the aspects  
14 that showed a strongest relationship with posttraumatic sequelae in survivors. This is  
15 consistent with previous research, which shows that maternal depression and other forms of  
16 reduced responsivity in mothers (i.e. dissociation) have a very powerful traumatic impact upon  
17 children (Beebee & Lachman, 2014).  
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22 The experience of childhood cancer may be especially challenging to the emotional balance  
23 within the mother-child relationship. In Western countries, mothers function usually as  
24 primary caregivers during hospitalization, and are involved in the everyday, moment-to-  
25 moment episodes related to the child's illness and treatment. They witness (and sometimes  
26 are directly affected by) the patient's experiences of uncertainty, pain and distress, which take  
27 place repetitively, along protracted periods of time. Emotional responses and attitudes that  
28 are activated within this mother-child dyad seem to be a very important factor in the child's  
29 long-term adjustment to cancer.  
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32 Among predictors of PTSS, the one that showed a strongest predictive value was mothers'  
33 illness-related unregulated responses. By what means may these unregulated responses  
34 complicate adjustment in the child? We believe that these responses may impact upon the  
35 child with cancer in different ways, all of them pertaining to the processes of adjustment and  
36 recovery from trauma:  
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- 39 1. They may be used by the child as a social reference (Emde, 1992) that indicates the  
40 presence of an insurmountable threat. In this way, they can make the child appraise  
41 her illness as highly dangerous and induce a sense of persistent threat (Ehlers & Clark,  
42 2000), which is central in PTSD.
- 43 2. They may compound or prolong some of the child's emotional responses, maintaining  
44 dysregulation (Markese, 2011; Schechter & Davies, 2007; Scheeringa & Zeanah, 2001;  
45 Stolorow, 2012).
- 46 3. They may compromise the reprocessing traumatic memories (Salmon & Bryant, 2002),  
47 affecting recovery.
- 48 4. They may also promote maladaptive coping mechanisms, such as avoidance, another  
49 factor that which hinders recovery from PTSD (Ehlers & Clark, 2000).  
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54 It is noteworthy that, contrary to what was expected from previous research, mothers' PTSS  
55 were not a significant predictor of survivors' PTSS in the model. Our results suggest that the  
56 aspects of parental illness-related functioning we introduced in this research may be more  
57 important for the study and treatment of posttraumatic responses.  
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3 It must be remembered, however, that these hypotheses point only to one direction of the  
4 parent-child relationship. An inverse casual relation (i.e. parents' illness-related responses  
5 being affected by children's PTSS) could also take place. For a relational framework to be  
6 integral, future studies must gather knowledge on what the child brings to this relationship  
7 and how this may affect her and her parents' adaptation.  
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10 Our research sheds light on particular aspects of the parent-child relationship that may inform  
11 the work of nurses and mental health professionals within the field of pediatric oncology. The  
12 results indicate that both parental emotions, cognitions and, more importantly, behaviors  
13 related to the child's illness, play a significant role in the emergence of long-term  
14 posttraumatic responses among patients, and therefore should be considered within a  
15 framework of assessment and prevention. Also, there is a need among professionals of  
16 screening tools that tap into these processes. Instruments that were used in this research (The  
17 Parents' Experience of Child Illness, PEI; and The Parental Response Style Questionnaire,  
18 CERP) showed promise in that respect.  
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21 Limitations of this study are its cross-sectional nature, which prevents the causal  
22 understanding of results, as well as the exclusive use of self-report measures, which limits a  
23 nuanced, in-depth assessment of parental illness-related processes. Future research should  
24 include longitudinal designs, as well as the use of interviews and observational measures  
25 (Scheeringa et al., 2015) that will allow us to assess child-parent processes in face of trauma. It  
26 will also be important to test whether interpersonal processes are significant in the  
27 posttraumatic process of children regardless of the type of trauma, or rather are only  
28 important in the context of traumas such as pediatric cancer, in which the parents are often  
29 involved and exposed.  
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7 Table 1. Descriptive statistics for demographic and treatment-  
8 related variables

9 Sex		
	Men	45.3%
	Women	54.7%
13 Age		
	M	45.3%
	SD	54.7%
17 Age at diagnosis		
	M	6,92
	SD	4.81
21 Treatment duration (years)		
	M	1.37
	SD	1.02
24 Time off treatment (years)		
	M	3.38
	SD	3.41
27 Treatment intensity (range: 0-52)		
	M	12.53
	SD	4.19

37 Table 2. Correlations between survivors' PTSS and dimensions parental illness-related  
38 functioning

40 Parents' unregulated responses (CERP)		
	Irritability/rejection	.48***
	Emotional overwhelming	.62***
	Overprotection	.41***
	Depressive affect	.57***
45 Parents' negative emotions/cognitions		
	Guilt and preoccupation	.56***
	Unresolved sorrow and anger	.55***
	Long-term uncertainty	.49***
49 Parents' PTSS		.39***

50 Note: PTSS = Posttraumatic Stress Symptoms. \*p<0.05; \*\*p<.01; \*\*\*p<.001  
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Table 3. Hierarchical regression model predicting PTSS controlling for age at diagnosis, duration of treatment and treatment intensity among pediatric cancer survivors

	R <sup>2</sup>	Δ R <sup>2</sup>	B	SE B	β
Dependent variable: survivors' PTSS					
Step 1	.08*				
Age at diagnosis			.558	.294	.204
Duration of treatment			.143	.118	.135
Time off treatment			-.072	.034	-.225*
Treatment intensity			.511	.338	.163
Step 2	.55**	.46**			
Age at diagnosis			.372	.777	.196
Duration of treatment			.519	.208	.190*
Time off treatment			.055	.085	.052
Treatment intensity			-.025	.024	-.079
Mothers' negative emotions/cognitions			.194	.094	.250*
Mothers' unregulated responses			.453	.081	.550***
Mothers' PTSS			-.022	.054	-.043

Note: PTSS = Posttraumatic Stress Symptoms. \*p<0.05; \*\*p<.01; \*\*\*p<.001

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