

The relationships between maladaptive coping strategies and long-term posttraumatic stress symptoms after pediatric burns in mother and child

Master thesis Clinical Psychology

Juul van Bavel

5485940

Utrecht University

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Supervisor: Marthe Egberts

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Universiteit Utrecht

Abstract

Objective: This study examined the intrapersonal and interpersonal relationships between mother and child maladaptive coping strategies rumination, catastrophizing and self-blame and posttraumatic stress symptoms (PTSS) 3 and 12 months after pediatric burn injuries.

Method: A total sample of $n=71$ with dyads of mothers and children older than eleven participated in the study. Within the first month after the burn event (T1) the Cognitive Emotion Regulation Questionnaire was completed by mother and child to measure coping strategies. Moreover, at T1, at 3 months (T2) and 12 months (T3) postburn the Impact of Event Scale was completed by mothers and the Children's Responses to Trauma Inventory was completed by children to measure PTSS. Correlation analyses and hierarchical multiple regression analyses were performed to obtain data. **Results:** An interrelation was found between mother and child rumination. Moreover, catastrophizing and rumination were found to be significant predictors for PTSS within-person and between-person. However, this last effect was not found in all examined sub questions at all time points. Moreover, the maladaptive coping strategies together had significant predictive value of PTSS T2 and T3 in children. **Conclusions:** The results indicate that some maladaptive coping strategies predict PTSS 3 and 12 months after pediatric burns in mother and child individually and interpersonally. However, not all expected effects were consistently found and some effects were contradicting. Still, findings indicate that clinical interventions after pediatric burns should aim at avoiding maladaptive coping strategies and that processes of coping and development of PTSS should be considered as interrelated between family members.

Introduction

Pediatric burn injuries do not only have impact on the physique, but have psychological impact as well (Bakker, Maertens, van Son, & van Loey, 2013). Besides the accident itself, the aftermath including hospitalization, potential surgery and getting scars are stressful experiences. The highest risk group for burn injuries consists of young, preschool children (Collins & Allbon, 2009). Research has found that a substantial amount of children with pediatric burns display at least some distressed behaviour after the accident (Bakker et al., 2013). Children can develop several psychological disorders, with posttraumatic stress disorder as the most prevalent one (De Young, Kenardy, Cobham, & Kimble, 2012). Posttraumatic stress disorder involves symptoms of intrusions, avoidance behaviour, negative affect and cognitions and significant changes in arousal (American Psychiatric Association, 2013). The distinction can be made in *posttraumatic stress disorder* (PTSD) and *posttraumatic stress symptoms* (PTSS). A number of studies reported the high long-term prevalence of PTSD and PTSS after pediatric burn injuries in preschool aged children (De Young et al., 2012; Graf, Schiestl, & Langdolt, 2011; Stoddard et al., 2006) and older, school aged children (Landolt, Buehlmann, Maag, & Schiestl, 2009; Saxe et al., 2005). Most studies report a long-term prevalence of approximately 30%. Thus a significant part of children with pediatric burns develop PTSS. This is a persistent effect, that appears in various ages.

Not only the injured child is affected, but the whole family has to cope with the impact of the accident. In the first months postburn, PTSD was reported in 19% of parents (Hall et al., 2005). Moreover, even 47% of parents showed elevated PTSS. In the long run, PTSS was found in 42% of mothers at one to two years postburn and in 19% ten years postburn (Bakker, van Loey, Van Son, & Van der Heijden, 2010). In conclusion, parent and child are both affected after pediatric burns and PTSS is significantly present.

Hence, the traumatic, stressful experience of the accident and the aftermath can lead to PTSS in mother and child individually, but less is known about the interdependence of mother and child PTSS. Scheeringa and Zeanah (2001) found that the parent-child relationship profoundly influences the post-trauma symptomatology of children, calling this construct 'relational PTSD'. They propose relational PTSD as a compound effect of the co-occurrence of PTSS in parent and child, when the symptoms of parent exacerbate the symptoms of the child. Supporting this construct, a meta-analysis of Morris, Gabert-Quillen and Delahanty (2012) confirms the association between parental PTSS responses and child PTSS. Another study showed a significant mutual and longitudinal association between parental PTSS and their children's recovery from PTSS after traumatic experiences (Landolt, Ystrom,

Sennhauser, Gnehm, & Vollrath, 2012). Concluding, the way child and parent react to the traumatic event seems to have a reciprocal relationship in developing PTSS. Scheeringa and Zeanah (2001) conclude that it is important to understand the symptomatology in parent and child and the mutual influence to improve prevention and treatment.

Besides the reciprocal influence of parent and child's response to traumatic experiences and developing PTSS, coping strategies play an important role as well. Multiple studies suggest that different coping strategies after a traumatic event have a significant impact on developing PTSD later in life (Bryant, Marosszeky, Crooks, Baguley, & Gurka, 2001; Lawrence & Fauerbach, 2003; Street, Gibson, & Holohan, 2005). More specifically, the empiric research which is done with the CERQ (a questionnaire for coping strategies) shows that mostly ruminating, catastrophizing and self-blame are coping strategies which are predictors for developing psychopathology, so these are unfavourable and can be called 'maladaptive coping strategies' (Garnefski, Kraaij, & Spinhoven, 2002). Other studies support this: trauma-related ruminating can predict chronic PTSD (Wells & Sembi, 2004), catastrophizing and rumination predicted PTSS after a terrorist attack (Jenness et al., 2016), and self-blame is found to be predictive of elevated PTSS in victims of rape (Moor & Farchi, 2011). Research also confirms a role for coping in the development of PTSS in children over the weeks following pediatric injury, because maladaptive coping strategies mediated the association between early and later PTSS (Marsac et al., 2017). If and how these effects of coping strategies are specifically applicable to young victims of burn injuries and their parents is, to our knowledge, not examined before.

So, the intrapersonal effect of coping on PTSS is clear, but coping seems to be interdependent between dyads as well, as the term 'Dyadic Coping' arose years ago, from the conceptualization of stress and coping in partners being interdependent (Bodenmann, 1997). Research on interdependent coping between parent and child is less convincing, although Aisenberg and Ell (2005) proposed a model of parent-child interdependent coping with community violence, in which coping strategies of parent and child were highly correlated. Bronfenbrenner (1979) stated that a child is embedded in a complex, interconnected social system. This system exerts dynamic and reciprocal influences of coping after traumatic experiences. Moreover, coping in one family member might influence PTSS of the other family member as well. Because of their own coping strategies, parents could encourage avoidant coping strategies in their children and these child avoidant coping strategies are associated with higher child-reported PTSS six months post-trauma (Hiller et al., 2018). Another study showed that parental rumination was associated with more symptoms of stress,

worry and anxiety in their children (Psychogiou, 2017). If these interpersonal processes are reversible and applicable for children's coping on parental PTSS, seems unclear. Moreover, these constructs are, to our knowledge, not examined in the context of pediatric burns before.

Concluding, there are certain gaps in literature. It seems unclear how coping and relational PTSD is related, research on the effect of children's coping on parental PTSS is lacking and it is unclear if the found effects are applicable to pediatric burn injuries. Therefore it is socially and clinically relevant to understand the mutual relationships between child and mother coping and PTSS to further advance the prevention of PTSS after pediatric burns. If we know which children and mothers are likely to develop PTSS and why, and if we understand these processes, training on the use of adaptive coping strategies, or how to avoid maladaptive coping strategies, could be advantageous.

To further develop the current knowledge, the aim of the present study is to investigate the relationships between coping and PTSS after pediatric burns on an intrapersonal and interpersonal level. Therefore, the following research questions will be looked into:

- 1- What is the relationship between child and mother maladaptive coping strategies?
- 2- What is the relationship of PTSS 3 and 12 months postburn between mother and child?
- 3- What is the within-person relationship between maladaptive coping strategies and development of PTSS 3 and 12 months postburn (intrapersonal relationship of mother and child individually)?
- 4- What is the between-person relationship between maladaptive coping strategies and development of PTSS 3 and 12 months postburn (interpersonal relationship between mother and child)?

We examined these effects with three coping strategies specifically: ruminating, catastrophizing and self-blame. Based on literature mentioned before, we hypothesized that maladaptive coping strategies between mother and child are correlated. Moreover, we expect that PTSS 3 and 12 months postburn between mother and child is interdependent, so that high child PTSS means high parental PTSS and vice versa. Furthermore, we hypothesized that these maladaptive coping strategies predict PTSS 3 and 12 months postburn in mother and child individually. Finally, we predict that mother maladaptive coping strategies will predict child PTSS and that child maladaptive coping strategies will predict mother PTSS, so that this is a reciprocal effect. A schematic view of the research questions is shown in figure 1.

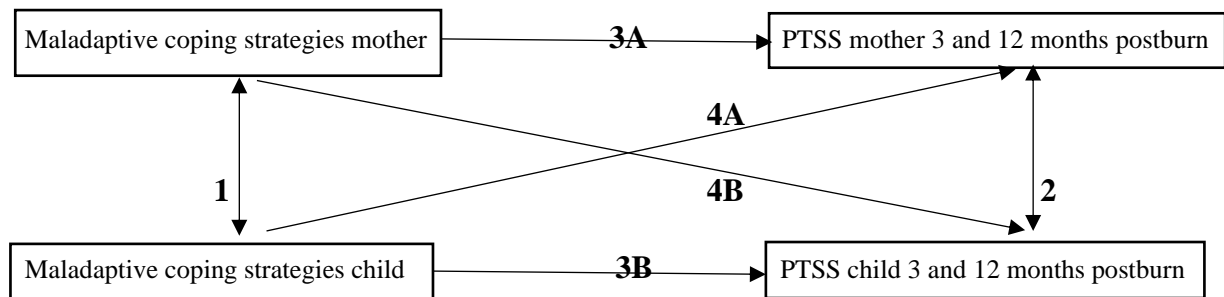


Figure 1. Schematic view of the research questions.

Methods

Procedure

Data for this study were collected as part of a larger prospective study on child (age 8 to 18 years) and parental adjustment after pediatric burns. The study was approved by two independent ethic committees in the Netherlands and Belgium. From April 2007 to July 2011 data were collected in three Dutch burn centers and four Belgian burn centers. Data collected within the first month postburn (T1), at three months postburn (T2) and at 12 months postburn (T3) were used for the present study. Families could participate in this study if the child has been in the hospital for more than 24 hours and the percentage of total body surface area burned was at least 1%. There were several exclusion criteria: limited Dutch language proficiency, child cognitive impairment and self-inflicted burns. Oral and written information was offered by researchers at the burn centers. Written informed consent was obtained from mothers, fathers and children. Researchers requested to complete questionnaires for T1 within the first four weeks of admission and follow-up at T2 and T3 consisted of mail-out questionnaires.

Participants

Of the 202 families eligible for this study, 22(11%) declined to participate, 15(7%) children were already discharged before the family could be approached and 19(9%) families were not invited because the local researcher deemed their participation to be too demanding (e.g., severely ill family members, psychiatric background, severe financial problems or involvement of child protection services). 20 families(10%) gave their informed consent to participate, but completed none of the questionnaires. Children older than 11 were eligible to report their own coping strategies at T1, so children younger than 12 were excluded, resulting

in a total sample of $n = 71$ dyads. Mean age of mothers was 44.9 ($SD = 4.9$, range 30-55 years) and mean age of children was 15.1 ($SD = 1.53$, range 12-17 years). The sample of 71 children consisted of 13 girls (18.3%) and 58 boys (81.7%). Mean percentage of total body surface area (TBSA) burned was 10.4% ($SD = 13.73$, range 1-72%). The mean of days in the hospital was 20.4 ($SD = 33.1$, range 1-180). Of 67 children the etiology of the accident was reported. 47 accidents were caused by flames, 10 by hot fluid and 10 had other causes.

Of this sample, not all participants completed all questionnaires and drop-out rates were relatively high. An overview of the number of participants that completed the questionnaires is shown below in Table 1

Table 1

Number of mothers and children that completed the questionnaires

	Mothers	Children	Dyad mother -child ¹
Coping	50 (70%)	49 (69%)	43 (61%)
PTSS T1	64 (90%)	62 (87%)	55 (77%)
PTSS T2	51 (72%)	46 (65%)	42 (59%)
PTSS T3	38 (54%)	40 (56%)	35 (49%)
All measures ²	35 (49%)	33 (46%)	28 (39%)

Note. Total $n = 71$ participants for which information was available

¹ Number and percentage of dyads of mother and child that completed the questionnaires

² Number and percentage of mothers, children and dyads that completed all questionnaires at all time points

Measures

Coping. The Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven, 2002) was used to assess cognitive coping strategies at T1 in mother and child. Mother and child completed the same questionnaire, but with slightly different use of language (more informal version for children). This scale is validated for children older than 11 (Cotan, 2002). This questionnaire measures nine different coping strategies. In the current study, three specific coping strategies were looked into: ruminating, catastrophizing and self-blame, representing maladaptive coping strategies (Garnefski, Kraaij, & Spinhoven, 2002). The questionnaire consists of 36 items and mothers and children were asked to rate the frequency of thoughts and behaviors in response to the pediatric burn on a five point Likert scale (ranging from 1= (almost) never, 2= rarely, 3= sometimes, 4= often and 5= (almost) always). All subscales consisted of four items. The total scale scores for each coping strategy could range from 4-20, with higher scores meaning more use of the coping strategy. In the

current sample, Cronbach's alpha for mother ruminating was .76 and for child ruminating .77, for mother catastrophizing .67 and for child catastrophizing .73, and for mother self-blame .69 and for child self-blame .82. This means that subscales catastrophizing and self-blame for mothers are considered as having questionable internal consistency (Gliem & Gliem, 2003).

PTSS mother. The Impact of Event Scale (IES; Horowitz, Wilner & Alvarez, 1979; Sundin & Horowitz, 2002) was used to assess PTSS in mothers at T1, T2 and at T3. This questionnaire measures two dimensions of posttraumatic stress, namely symptoms of intrusion and symptoms of avoidance. The Dutch version was completed at all time points (Brom & Kleber, 1985). The questionnaire consists of 15 items and mothers were asked to rate the frequency of experienced symptoms in relation to their child's burn injury on a four point Likert scale (ranging from 0= not at all, 1= rarely, 3= sometimes, 5= often). The total score could range from 0-75 points, with higher scores meaning higher stress levels. Cronbach's alpha for the IES was .87 at T1, .89 at T2 and .89 at T3, meaning that the IES has good internal consistency at all timepoints (Gliem & Gliem, 2003).

PTSS child. The Children's Responses to Trauma Inventory (CRTI, revised version, Alisic, Eland, & Kleber, 2006) was used to assess PTSS in children at T1, T2 and at T3. This questionnaire consists of 34 items measuring four subscales: intrusions, avoidance, arousal and other child-specific responses. Children were asked to rate the frequency of experienced trauma-related responses in the past seven days in relation to their burn injury on a five point Likert scale (1= not or never, 2= rarely or almost never, 3= a little or sometimes, 4= quite a lot or quite often 5= very much or always). The total score could range from 34-170, with higher scores meaning higher stress levels. In the current sample, Cronbach's alpha for the CRTI was .82 at T1, .86 at T2 and .91 at T3, meaning that the CRTI has good internal consistency at T1 and T2 and excellent internal consistency at T3 (Gliem & Gliem, 2003).

Child- and burn characteristics. Children's characteristics (gender and age) and the burn characteristics (TBSA burned, number of surgery/skin grafting procedures and length of stay in the hospital) were obtained from the medical file. TBSA burned is the estimated percentage body surface area affected by burns. Within the first month postburn, information on the location of the accident (at home or somewhere else) and the cause of the burn was provided by parents.

Statistical analyses

All statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 25. Prior to analyses, data were inspected for accuracy of entry and missing values, and the score distributions were examined. Results were considered statistically significant if the p -value was $<.05$

In order to examine hypothesis one (figure 1) we calculated the correlations between mother and child maladaptive coping strategies. In order to examine hypotheses two we calculated the correlation between the total scores on mother PTSS and child PTSS on T2 and T3.

In order to examine hypothesis three and four the intrapersonal and interpersonal effects of coping on PTSS were tested by four hierarchical multiple regression analysis. First, multicollinearity, heteroscedasticity, and outliers were looked into through a residual scatterplot and collinearity diagnostics. The dependent variable alternately consisted of child PTSS T2, child PTSS T3, mother PTSS T2 and mother PTSS T3, making an amount of four multilinear regressions. The multilinear regressions all included all six predictors: ruminating, catastrophizing and self-blame for mother and child at all analyses. In step one, PTSS T1 was added to correct for PTSS T2, or in step one, both PTSS T1 and T2 were added to correct for PTSS T3. This was done so PTSS on longer term was corrected for PTSS on shorter term. In step two, the intrapersonal coping strategies were added and in step three the coping strategies of the other half of the dyad (interpersonal effect) were added.

Results

Research questions one and two: correlations coping and PTSS T2 and T3 mother and child

In order to examine the association between child coping strategies and mother coping strategies and PTSS T2 and PTSS T3 between the child and the mother, Pearson's correlation analysis was conducted. Table 2 shows the means, standard deviations and intercorrelations of the variables.

Table 2

Means, standard deviations and Pearson correlations among mother and child coping strategies, PTSS T2 and PTSS T3

	1	2	3	4	5	6	7	8	9	10
1. Child catastrophizing	-									
2. Child ruminating	.64**	-								
3. Child self-blame	.23	.11	-							
4. Mother catastrophizing	.17	.34*	.02	-						
5. Mother ruminating	.29	.40**	.18	.42**	-					
6. Mother self-blame	-.15	-.03	.29	.11	.35*	-				
7. Child PTSS T2	.58**	.59**	.02	.31	.08	.06	-			
8. Child PTSS T3	.46**	.46**	.08	.01	.23	-.02	.13	-		
9. Mother PTSS T2	.21	.41**	-.07	.37**	.30*	.02	.14	.13	-	
10. Mother PTSS T3	.22	.32	.14	.40*	.31	.14	.61**	.13	.09	-
<i>M</i>	7.39	7.42	10.22	7.10	9.66	6.85	14.37	16.57	47.15	52.49
<i>SD</i>	2.98	3.02	4.64	2.45	3.24	2.81	12.44	13.23	13.02	13.26

Note. * $p < .05$, ** $p < .01$
n range 29-50

In order to examine research question one, we looked at the correlations between the maladaptive coping strategies among mother and child. The correlation between child and mother catastrophizing indicated a small effect ($r = .17$, $p = .29$). For self-blame the effect was small as well ($r = .29$, $p = .06$). The effect of mother and child rumination was medium and significant ($r = .40$, $p = .01$).

In order to examine research question two, we looked at the correlations between PTSS T2 and PTSS T3 among mother and child. The correlations indicated small effects for both PTSS T2 ($r = .14$, $p = .42$) and PTSS T3 ($r = .13$, $p = .42$).

Research question 3A and 4A: the intrapersonal and interpersonal effect of maladaptive coping on mother PTSS

Data met the assumption of collinearity. For PTSS T2, homogeneity of variance and linearity was not a concern. The scatterplot for PTSS T3 showed some funneling, indicating greater spread at high scorers for PTSS T3. This might indicate a violation of the assumption of homoscedasticity. Because not all variables were normally distributed, a bootstrapping method was used (with $n = 1000$ bootstrap resamples).

An hierarchical multiple regression analysis was calculated to predict mother PTSS T2 based on mother and child coping strategies. Another hierarchical multiple regression analysis was calculated to do the same for mother PTSS T3. Table 3 shows the R square change, beta and bootstrap confidence intervals of variables.

In the analysis of mother PTSS T2, the ΔR^2 of step one was significant ($\Delta R^2=.40$, $p<.001$) meaning that 40% of the explained variance was due to PTSS T1. The 95% bootstrap confidence intervals were used as a reference to see if the predictors had a significant effect on mother PTSS T2. As shown in table 3, PTSS T1, mother catastrophizing and child ruminating were significant positive predictors for mother PTSS T2.

In the analysis of mother PTSS T3, the ΔR^2 of step one was significant ($\Delta R^2=.58$, $p<.001$) meaning that 58% of the explained variance was due to PTSS T1 and PTSS T2 and only PTSS T1 was a significant positive predictor for mother PTSS T3.

Table 3

Hierarchical multiple regression analyses predicting mother PTSS T2 and T3 based on coping strategies mother and child

Predictor	PTSS T2				PTSS T3			
	ΔR^2	p	B	95% CI	ΔR^2	p	B	95% CI
Step 1	.40***	.000			.58***	.000		
PTSS T1			.54	[.253, .842]			.52	[.127, .682]
PTSS T2							.19	[-.034, .649]
Step 2	.06	.238			.03	.528		
Mother catastrophizing			.95	[.027, 2.517]			.87	[-.638, 2.461]
Mother ruminating			.34	[-.474, 1.266]			.25	[-.702, 1.844]
Mother self-blame			-.47	[-2.201, .692]			.50	[-1.763, 1.720]
Step 3	.08	.124			.03	.661		
Child catastrophizing			-.39	[-1.919, .478]			.48	[-1.370, 2.562]
Child ruminating			1.41	[.298, 3.350]			.19	[-2.123, 2.411]
Child self-blame			-.17	[-.781, .466]			.16	[-1.139, 1.402]
Total R^2	.54				.63			
n	43				33			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Step one consisted of PTSS T1 when analyzing PTSS T2 and when analyzing PTSS T3, step one consisted of PTSS T1 and PTSS T2

CI = confidence interval

Predictors were considered as significant if 0 was not within the confidence interval

Significant predictors, based on the confidence interval, are in bold

Research question 3B and 4B: the intrapersonal and interpersonal effect of maladaptive coping on child PTSS

Data met the assumption of collinearity. For PTSS T2, homogeneity of variance and linearity was not a concern. The scatterplot for PTSS T3 showed some funneling, indicating greater spread at high scorers for PTSS T3. This might indicate a violation of the assumption of homoscedasticity. A bootstrapping method was used (with $n=1000$ bootstrap resamples).

An hierarchical multiple regression analysis was calculated to predict child PTSS T2 based on mother and child coping strategies. Another hierarchical multiple regression analysis was calculated to do the same for PTSS T3. Table 4 shows the R square change, beta and bootstrap confidence intervals of variables.

In the analysis of child PTSS T2, the ΔR^2 of step one was significant ($\Delta R^2=.24$, $p=.002$) meaning that 24% of the explained variance was due to PTSS T1. The ΔR^2 of step two was significant as well ($\Delta R^2=.26$, $p=.004$) meaning that 26% of the explained variance was due to child maladaptive coping strategies together. Step three did not significantly add something to the explained variance. PTSS T1 and child ruminating were significant positive predictors for child PTSS T2. Mother ruminating was a significant negative predictor, meaning that lower scores on mother ruminating predicted higher scores on child PTSS T2. This is remarkable, because it is against expectations.

In the analysis of child PTSS T3, the ΔR^2 of step one was significant ($\Delta R^2=.40$, $p=.002$) meaning that 40% of the explained variance was due to PTSS T1 and PTSS T2. The ΔR^2 of step two was significant as well ($\Delta R^2=.24$, $p=.011$) meaning that 24% of the explained variance was due to child maladaptive coping strategies together. Step three did not significantly add something to the explained variance. PTSS T2 and child catastrophizing were significant positive predictors for child PTSS T3.

Table 4

Hierarchical multiple regression analyses predicting child PTSS T2 and T3 based on coping strategies mother and child

Predictor	PTSS T2				PTSS T3			
	ΔR^2	p	B	95% CI	ΔR^2	p	B	95% CI
Step 1	.24**	.002			.40**	.002		
PTSS T1			.50	[.171, .897]			-.12	[-.621, .208]
PTSS T2							.74	[.212, 1.364]
Step 2	.26**	.004			.24*	.011		
Child catastrophizing			1.24	[-.239, 2.779]			3.05	[.223, 5.482]
Child ruminating			1.45	[.029, 3.579]			-.25	[-1.525, 1.277]
Child self-blame			-.13	[-.845, .514]			-.42	[-1.049, .395]
Step 3	.10	.078			.04	.539		
Mother catastrophizing			1.37	[-.450, 2.759]			-.72	[-3.025, 1.654]
Mother ruminating			-1.43	[-2.762, -.392]			.52	[-1.004, 1.686]
Mother self-blame			.75	[-.722, 1.814]			.37	[-1.639, 2.017]
Total R^2	.61				.67			
n	36				28			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Step one consisted of PTSS T1 when analyzing PTSS T2 and when analyzing PTSS T3, step one consisted of PTSS T1 and PTSS T2

CI = confidence interval

Predictors were considered as significant if 0 was not within the confidence interval

Significant predictors, based on the confidence interval, are in bold

Discussion

In the current study, the associations between mother and child maladaptive coping and PTSS 3 and 12 months after pediatric burn injuries were investigated. Based on this study we can conclude that mother and child coping strategy ruminating is interrelated, that mother catastrophizing and child ruminating are predictors for mother PTSS 3 months postburn, that child ruminating predicts child PTSS 3 months postburn and that child catastrophizing predicts child PTSS 12 months postburn. Moreover, the coping strategies ruminating, catastrophizing and self-blame together predicted PTSS 3 and 12 months postburn in children.

First, the interdependence of mother and child maladaptive coping within one month postburn was looked into. The results showed that mother and child rumination was interrelated, whereas no evidence was found for an association between mother and child self-blame and catastrophizing. Co-rumination could be an underlying mechanism explaining the found association between mother and child rumination. Co-rumination refers to extensively discussing and revisiting problems and focusing on negative feelings, so that these feelings are reciprocally reinforced, mainly found in adolescent friendships (Rose, 2002). Perhaps this phenomenon is present in mothers and children with pediatric burns. An alternative explanation for not finding the interrelatedness of catastrophizing and self-blame between mother and child is that older children are less dependent on their parents (Polan & Hofer, 2008). In the present study, children younger than 12 were excluded, because of methodological reasons. This could mean that in the present sample, child and mother cope with pediatric burns more independently. Moreover, at this age, less parents are present when the pediatric burn injury occurred (Egberts, van de Schoot, Geenen, & van Loey, 2018). Feelings of shame and guilt are therefore expected to be less prevalent in parents of older children with pediatric burn injuries. Feelings of shame and guilt trigger the use of the coping strategy self-blame (Tilghman-Osborne, Cole, Felton, & Ciesla, 2008) and catastrophizing (Szentágotai-Tâtar & Miu, 2016). It would be interesting to see if interrelatedness can be found in samples with younger children.

Second, we examined the co-occurrence between mother and child PTSS 3 and 12 months postburn. No evidence was found for an association between mother and child PTSS 3 and 12 months postburn. However, based on the construct of relational PTSD (Scheeringa, & Zeanah, 2001), expected was that PTSS in mother and child would be correlated. Moreover, Morris, Gabert-Quillen and Delahanty (2012) found associations between parental PTSS responses and child PTSS. This was found to be a long-term effect as high PTSS in parents was longitudinally related to poorer recovery from PTSS in the child (Landolt et al., 2012). A

possible explanation for the absence of the effect in the current study is again is that older children are less dependent on their parents (Polan & Hofer, 2008). Furthermore, in general, young children show higher PTSS than older children (Bokszczanin, 2007). Moreover, in another study that used the same data, it was shown that in this sample in general children show lower PTSS scores, in contrast to their mothers, who show higher PTSS scores (Egberts et al., 2018). Again, future study could aim at investigating the interrelatedness in samples with younger children.

Third, we looked at the intrapersonal effect of maladaptive coping strategies on PTSS 3 and 12 months postburn in mothers and found that catastrophizing was a significant predictor for PTSS 3 months postburn. The found effect of catastrophizing is supported by the theory of Ehlers and Clark (2000), stating that the sense of threat arises as a consequence of excessively negative appraisals of the trauma. Catastrophizing refers to reoccurring negative appraisals of the traumatic experience (Sullivan, Bishop & Pivik, 1995). The strong sense of threat caused by catastrophizing could be the underlying mechanism of the found effect, although the current study did not demonstrate that this effect is long-term, because no predictors were found for PTSS 12 months postburn. Although Jenness and colleagues (2016) found that rumination is a risk factor for onset of PTSS, they state that rumination mediates the strong relationship with pre-existing internalizing symptoms and development of PTSS. In the current model, pre-existing internalizing symptoms were not included. Therefore it could be possible that mothers in the present sample had low pre-existing internalizing problems, and therefore the effect of rumination was not found. Furthermore, as stated earlier, self-blame could be less present in our sample, because parents are less present when the pediatric burn injury occurs in older children (Egberts et al., 2018). Feelings of shame and guilt are therefore possibly less prevalent in the current sample, and this could be an explanation of the absence of an effect for self-blame in mothers.

After looking into the intrapersonal effect in mothers, we investigated the interpersonal effect, by looking at the effect of child maladaptive coping on mother PTSS 3 and 12 months postburn. To our knowledge this was not investigated before. Child ruminating appeared to be a predictor for mother PTSS 3 months postburn. No significant predictors were found in child coping strategies on mother PTSS 12 months postburn. Rumination in children serves to rehearse the traumatic experience and maintained distress (Stallard & Smith, 2007). This maintained distress in children could be noticeable for parents and could therefore mediate the development of parental PTSS. The previously explained phenomenon of co-rumination could be a possible explanation as well (Rose, 2002). When children excessively

discuss their negative feelings this could lead to stronger PTSS in their parents. The interpersonal effect was not found for child self-blame and catastrophizing. It could be possible that these coping strategies are more self-directed and less visible for parents and are therefore less predictive of parental PTSS. The mechanisms underlying these effects require further research.

Last, we looked at the effect of mother and child maladaptive coping on child PTSS 3 and 12 months postburn. We found that child ruminating for PTSS 3 months postburn and child catastrophizing for PTSS 12 months postburn were significant predictors. Moreover, we found that the coping strategies together had significant predictive value of PTSS both 3 and 12 months postburn. The intrapersonal effect of catastrophizing was found in mothers as well and can be explained by the previously described mechanism of negative appraisals (Ehlers & Clark, 2000), although it is remarkable that this effect was only found for PTSS 12 months postburn and not for PTSS 3 months postburn. This could be because of methodological reasons. The explanation for finding an intrapersonal effect of rumination is that child rumination serves to rehearse the traumatic experience and maintained distress (Stallard & Smith, 2007). The effect for rumination was not found to be a long-term effect, since the effect was only demonstrated at 3 months postburn. No effect was found for self-blame. A possible explanation could be that some findings indicate that self-blame is more present in girls than in boys (Ullman & Filipas, 2005). The current sample consists of mostly boys, since more boys are victimised by pediatric burns (World Health Organization, 2013), and therefore self-blame could be less prevalent in the current sample. Although not all coping strategies individually were significant predictors, the coping strategies together had a significant predictive value of both PTSS 3 and 12 months postburn. Based on the present study, catastrophizing, self-blame and rumination together are unfavourable for the development of PTSS in children and this is a long-term effect.

Previous literature on the interpersonal effect of parental coping on child PTSS showed that parental rumination predicted symptoms of stress, anxiety and worry in their children (Psychogiou et al., 2017) and that avoidant parental coping strategies were associated with elevated PTSS in children (Hiller et al., 2018). In the present study, mother rumination was found to be a significant predictor for child PTSS 3 months postburn, although this effect was in the opposite direction, meaning that more mother ruminating predicted less child PTSS symptoms 3 months postburn. This contradicts our expectations and previous literature (Psychogiou et al., 2017). No other significant predictors were found. An alternative explanation for this found effect is not obvious, although it could be caused by our used

methodological model, in which we included all three coping strategies of mother and child and PTSS within the first month, or it could be because of the small sample size.

Strengths of the present study include the longitudinal and prospective design in which participants were questioned at several time points over a year, and inclusion of both mother and child as a dyad. However, some limitations need to be addressed. First, our sample was very small because of high drop-out rates and several exclusion criteria. This means that the power is small and generalization of findings may be affected. The incidence of burns in the age group under study is low and the refusal rate to participate is rather high (D'Souza, Nelson, & McKenzie, 2009), so larger sample sizes are hard to gain. Moreover, 81.7% of the child sample included boys. Although more boys are victim of pediatric burns and so this sample is quite representative (World Health Organization, 2013), caution should be taken when drawing general conclusions about coping and PTSS after traumatic experiences. Furthermore, different variables were heteroscedastic. Because this can invalidate statistical tests of significance, this is a major concern. Finally, coping was measured exclusively within one month postburn. Therefore it is unclear if mother and child used the same coping strategies at the time PTSS scores were obtained.

Based on the current study, we can conclude that child and mother coping and PTSS after pediatric burn injuries are interrelated. Most effects were found in rumination and catastrophizing. These effects were not consistently found in all research questions at all time points. The coping strategies ruminating, catastrophizing and self-blame together predicted PTSS 3 and 12 months postburn in children. The current study proves the non-beneficial outcome of the coping strategies ruminating, catastrophizing and self-blame after pediatric burns, so the clinical implication raises that these coping strategies should be prevented and modified early on. It is proven that modifying coping strategies is very successful (Beck, 2011), and therefore treatment after pediatric burns should aim at avoiding maladaptive coping strategies, so PTSS later on could be prevented. Furthermore, early screening of victims and family members could identify people at risk of developing PTSS by discovering their coping strategies and suited prevention programs can be used for these risk groups. Moreover, the current study demonstrates the need for integrating all affected family members in interventions, since associations were found between mother and child. Treatment and prevention should consider families as a network with strong associations instead of considering affected children and family members as isolated individuals.

The present study raises questions future studies should aim at. First, it would be interesting to see how the investigated relationships will manifest in samples of younger

children. Moreover, since the whole family is involved, inclusion of fathers and siblings is clinically and socially relevant as well. Furthermore, factors that mediate the found effects should be identified to create a better understanding of the processes. Moreover, the current methodological model includes all coping strategies and PTSS within the first month. In all analyses, short-term PTSS had a significant effect and this could lead to a small explained variance of the other factors. We recommend future studies to use another methodological model in which the effects of coping strategies could become more clearly visible. Finally, the present study included only three coping strategies. Future research could include other coping strategies to create a broader vision.

There is an urgency of good care for all family members of children with pediatric burns, since all family members could be psychologically harmed due to this impactful event (Bakker et al., 2013). To get there, we still have a lot of work to do to create better understanding of the processes underlying the risk of psychological complaints. If there is a better understanding of these processes, prevention and treatment of psychological difficulties after pediatric burn injuries for all affected family members could be improved.

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