

# Parenting stress as a mediator of parents' negative mood state and behavior problems in children with newly diagnosed cancer

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## Abstract

**Objective:** The aim was to investigate the influence of parents' negative mood state and parenting stress on behavior in children with newly diagnosed cancer.

**Methods:** A total of 123 parents ( $n = 58$  fathers,  $n = 65$  mothers) of 67 children with newly diagnosed cancer completed three questionnaires separately at the same time measuring parents' negative mood state, parenting stress, and child behavior problems.

**Results:** Parents' negative mood state was weakly correlated to more child behavior problems ( $r = 0.31$ ,  $p < 0.01$ ), and higher levels of parenting stress were strongly correlated to more child behavior problems ( $r = 0.61$ ,  $p < 0.01$ ). Mediation analyses indicated that the relationship between parents' negative mood state and child behavior problems ( $c = 0.29$ ,  $p = 0.02$  (fathers);  $c = 0.25$ ,  $p = 0.04$  (mothers)) became non-significant after mediating for parenting stress ( $c' = 0.003$ ,  $p = 0.98$  (fathers);  $c' = 0.10$ ,  $p = 0.42$  (mothers)). The indirect effect of parents' negative mood state and child behavior problems was only significant for fathers (95% CI [0.12; 0.51]), indicating that parenting stress mediates the effect between fathers' negative mood state and child behavior problems.

**Conclusions:** This is the first study to demonstrate the mediational role of parenting stress in fathers of a child with newly diagnosed cancer.

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## Introduction

The initial diagnosis and start of treatment for childhood cancer is an overwhelming life event, as the onset of pediatric cancer can be very abrupt and unexpected, completely changing the lives of the child, parents, siblings, and other family members [1–4]. Directly after the diagnosis of childhood cancer, children experience emotional distress [5] and are more likely to have internalizing behavioral problems and somatic complaints [6]. The child's emotional and behavioral response shortly after diagnoses can be explained by a range of stressful events that is associated with the initial stage of childhood cancer, such as the diagnosis, uncertainty, and the start of treatment for childhood cancer [4]. Equally, parents experience substantial distress shortly after diagnosis, relative to normative data [2,5,7–11]. Parents have been documented to be at risk of negative mood, as expressed by symptoms of posttraumatic stress [12], and symptoms of anxiety and depression [13].

Parenting a child with cancer can be very demanding, especially in the period shortly after diagnosis [4]. The influence of parents' negative mood in relation to their child's behavior has been explored in pediatric samples as well as healthy children [14–19]. In healthy children,

associations have been reported between parents' anxiety and anxiety in children [16,18], and between depression in parents and behavior problems in children [15–17,19]. Research specifically focusing on pediatric oncology provides evidence for the relationship between parents' negative mood and the psychological adjustment of children with cancer [20–23].

In addition to parents' negative mood, parenting a child with cancer can also lead to higher levels of parenting stress [24]. Parenting stress refers specifically to stress experienced in the parenting domain, and assessing parenting stress can provide an indication of dysfunctional parenting [25]. We were particularly interested in the influence of parenting stress in view of the changing dynamic between parent and child during initial treatment. Mothers and fathers ability to effectively parent their child in this stressful time is crucial in terms of adjustment. Compared with parents of a child with a physical disability, levels of parenting stress are higher in parents of a child with cancer [24]. Several studies have investigated parenting stress and child's behavior in the context of pediatric cancer [26–28] and have shown that higher levels of parenting stress are associated with internalizing and externalizing behavior problems in children [27], the child's social, emotional

and behavioral adjustment [26], and the child's adjustment after treatment ends [28].

Currently, little information is available about the interaction of these variables shortly after diagnosis. We were especially interested in the period shortly after diagnosis, as in recent years, a shift of care has occurred in pediatric oncology, with many children being treated as outpatients. This has the potential to increase stress for parents straight after diagnosis as they adapt to treatment protocols. In addition, future interventions to improve adjustment would be more beneficial during the early start of treatment, to optimize care for the child and family.

In pediatric oncology, studies have been undertaken to compare father and mothers in terms of psychosocial adjustment. Some report that psychological functioning of fathers and mothers in general is equivalent [8,29–31] and that both fathers and mothers play a role in the child's adjustment [21], whereas others report that mothers are at a higher risk for negative outcomes [32–35]. Moreover, differences have been reported in the use of some coping strategies [8], the role of family and child factors in the association between parents' and child's distress [21], in risk factors associated with distress levels in fathers and mothers [36], and different needs in support during their child's illness [37]. Therefore, separate analyses for fathers and mothers were carried out. Examining individual reactions of fathers and mothers to similar life events may endorse understanding of psychological and social differences between men and women [38].

In the current study, we explore the influence of parents' negative mood state and parenting stress on behavior of children with newly diagnosed cancer. The question that still remains unanswered in the literature is whether parents' negative mood state or more specifically parenting stress influences child behavior problems. By 'negative mood state' we refer to a broad measure of distress, which is measured by assessing mood disturbance on domains such as depression, anger, and tension among others. Clearly, the relationship between parental and child adjustment is likely to be reciprocal (i.e., behavior problems in children can influence negative mood state and parenting stress, and/or negative mood state and parenting stress can cause child behavior problems [39]), but in this study, we focus on the impact of parents' negative mood state and parenting stress on the behavior in children with newly diagnosed cancer. It has been suggested in the literature that it is likely that the relationship between parents' negative mood state and child behavior is less direct [40], with parenting stress or parenting behavior playing an important part in possibly mediating this relationship. Indeed, parenting stress has been linked to more negative parenting behavior in healthy children [41,42], and therefore, there is merit in exploring parenting stress as a mediator for the relationship between parents' negative mood state and child behavior. The current study will test the

hypothesis that parenting stress mediates the effect between parents' negative mood state and behavior problems in children with newly diagnosed cancer. Moreover, the study will test the hypothesis that the investigated associations differ for fathers and mothers.

## Methods

### Participants

Of all children diagnosed with cancer between August 2006 and April 2010, parents of 135 children were approached, on the basis of the eligibility criteria. Eligibility criteria were that the child was diagnosed with childhood cancer, received treatment at our university hospital, and had at least one Dutch-speaking parent.

This study focused on children who would undergo substantial treatment for cancer as an outpatient, which means that patients received the majority of their treatment as an outpatient and spent a minimal number of weeks in hospital as an inpatient as part of regular treatment. A shift of care has occurred now that children are often treated as outpatients, which has the potential to increase stress for parents straight after diagnosis as they adapt to treatment protocols. For this reason, children undergoing relatively minimal interventions, as well as children requiring long hospitalization (for instance children diagnosed with acute myeloid leukemia or treated with a stem cell transplantation), were excluded in this study.

Parents of 135 children were asked to participate; 123 parents (58 fathers and 65 mothers) of 67 children returned a completed questionnaire. Mothers and fathers were asked to complete a questionnaire separately during an outpatient clinic visit or at home, shortly after their child had been diagnosed with cancer. This study was approved by The Medical Ethical Committee of our university and written informed consent was obtained from all participants.

### Parents' negative mood state

The Dutch short form of the Profile of Mood States (POMS) was used to assess the negative mood state of parents [43]. For this questionnaire, parents were asked to rate 32 adjectives with regard to how they felt during the last week including today on a 5-point Likert scale, ranging from 0 (not at all) to 4 (extremely). The 32 items of the POMS short form can be divided into five scales: anxiety, depression, anger, vigor, and fatigue. The vigor subscale (as items in this scale are positively phrased) was recoded, and subsequently, the total negative mood state of parents can be calculated. The maximum score is 128 points. The POMS score is a reflection of the parents' negative mood state, and a higher score indicates greater mood disturbance. The psychometric properties of the Dutch translated version of the shortened POMS are

good [43–45], with a Cronbach's alpha for the five subscales varying between 0.85 and 0.95 [43].

### Parenting stress

We used the Dutch-translated short version of the Parenting Stress Index (PSI; Nijmeegse Ouderlijke Stress Index-Kort (NOSI-K)), which is a 25-item questionnaire in which parenting stress is measured. Each item of the questionnaire is scored on a 6-point Likert scale ranging from 1 (totally disagree) to 6 (totally agree). The maximum score for this questionnaire is 150 points. A higher score indicates increased parenting stress levels. The NOSI is a revised and extended version of Abidin's PSI, and includes the proposed scales of the original PSI. Difference between the two measures is that items that were less relevant to the Dutch situation were replaced by more relevant items. The NOSI-K (short form) reflects these differences. De Brock and colleagues determined a Cronbach's alpha between 0.92 and 0.95 for the Dutch translated short version of the PSI (NOSI-K) [46].

### Child behavior problems

Two Dutch versions of the Child Behavior Checklist (CBCL) were used to examine the behavior of the child: ages 1.5–5 years (CBCL/1.5–5) and ages 6–18 years (CBCL/6–18) [47,48]. The CBCL/1.5–5 is a 99-item questionnaire and consists of the following domains of which internalizing behavior problems (domains: emotionally reactive, anxious-depressed, somatic complaints, and withdraw), externalizing behavior problems (domains: attention problems and aggressive problems), and the total CBCL scale (domains: sleep problems, other problems, internalizing behavior problems, and externalizing behavior problems) can be calculated. The CBCL/6–18 is a 112-item questionnaire and consists of the following domains of which internalizing behavior problems (domains: anxious-depressed, somatic complaints, and withdraw), externalizing behavior problems (domains: rule-breaking behavior and aggressive behavior), and the total CBCL scale (domains: social problems, thought problems, attention problem, other problems, internalizing behavior problems, and externalizing behavior problems) can be calculated. Parents rated the behavior of their child on a scale ranging from 0 (not true) to 2 (often true). A higher score on each scale reflects more child behavior problems.

### Covariates

The following potential covariates of the child were assessed from the medical records: sex, age at diagnosis, and cancer type. Cancer type was coded as hematological malignancy, extra cranial solid tumor, brain tumor, and Langerhans Cell Histiocytosis. The following potential covariates were obtained from the parents by a questionnaire:

sex, age at time of the study, time between diagnosis and completion of the questionnaire, primary caregiver, biological parent, education level, and work status. Parental education level was scored as primary (primary school or less), secondary (preparatory secondary vocational education, senior secondary vocational education, or senior general secondary education), or high (pre-university education, higher professional education, or university), which we assume as a proxy for socioeconomic status.

### Data analyses

Data were analyzed using Statistical Package for Social Science (SPSS Inc., Chicago, IL, USA, version 17.0). Descriptive analyses were generated for all variables. Patient characteristics are presented as mean and standard deviation, and categorical data are presented as number and percentages.

Differences between fathers and mothers were calculated with non-parametric tests. To calculate the association between parents' negative mood state, parenting stress, and child behavior problems, Spearman correlation coefficient analysis were used.

To investigate whether the relationship between parents' negative mood state and child behavior problems was mediated by parenting stress, we performed a mediation analysis. Equally, we established a second model in which we investigated whether the relationship between parenting stress and child behavior problems was mediated by parents' negative mood state. We used Baron and Kenny's definition of mediation [49]. In this model, X represents the determinant variable, Y the outcome variable and M the possible mediator variable. The effect of the mediator is based on the following assumptions: (1) X significantly predicts Y; (2) X significantly predicts M, and M significantly predicts Y; and (3) M significantly predicts Y controlling for X [50]. Bias corrected and accelerated bootstrapping analyses were conducted, using the SPSS macro designed by Preacher and Hayes [50]. Bootstrapping does not rely on the assumption that the data present a normal distribution, and by bootstrapping the data, the likelihood of Type I errors decreases as the number of inferential tests are minimized [50]. In total, 5000 resamples were used. Data are represented as total, direct, and indirect effects. The total effect refers to pathway *c*, the relationship between X and Y before mediation. The direct effect refers to pathway *c'*, which is the relationship between X and Y after controlling for M. The indirect effect is the reduction of the effect of X on Y, or *c-c'*, and is considered as the amount of mediation.

We performed the mediation analyses twice: the first analysis was performed to investigate the mediational influence of parenting stress on the association between parents' negative mood state and child behavior problems, in which X represents parents' negative mood state, Y

represents child behavior problems, and M represents parenting stress. The second analysis was performed to investigate the mediational influence of parents' negative mood state on the association between parenting stress and child behavior problems. In this model, X represents parenting stress, Y represents child behavior problems, and M represents parents' negative mood state.

Before we performed the mediation analysis, we explored possible confounders by using non-parametric *t*-tests and simple regression analyses. We found that two covariates (parental age at time of the study and age at diagnosis of the child) changed the effect; therefore, the mediation analyses were adjusted for parental age and the child's age at diagnosis.

Results were considered statistically significant when the *p*-value was <0.05, two-tailed.

## Results

### Parental and child characteristics

Parents of 135 children were asked to participate; 123 parents (58 fathers and 65 mothers) of 67 children returned completed questionnaires. Of 56 children, both parents completed the questionnaire; of 11 children, only one parent completed the questionnaire. Mean time between the child's diagnosis and completion of the questionnaires was 5.2 weeks ± 3.9. Mean age of the parents at time of the study was 38.0 years ± 6.7. Parent characteristics are presented in Table 1.

Mean age at diagnosis of the 67 included children was 5.9 years ± 4.6. Thirty-six children were boys (54%), and 31 children were girls (46%). Altogether, 50 children were diagnosed with a hematological malignancy (75%), six children with a brain tumor (9%), nine children with an extra cranial solid tumor (13%), and two children with Langerhans Cell Histiocytosis (3%). Child characteristics are presented in Table 1.

### Non-response analyses

The 68 children of the non-responding parents were compared with the 67 children of the parents who responded in terms of gender, age at diagnosis, and diagnosis. No differences were found for gender (*p* = 0.66), age at diagnosis (*p* = 0.23), and diagnosis (*p* = 0.07) (Table 1).

### Parents' negative mood state, parenting stress, and child behavior problems

The median mood score of the included parents was 40 (range 0–95). No differences were found between the mood score in general between fathers and mothers (34 [0–90]; 43 [5–95], *p* = 0.07). Examining the gender differences for the subscales of the mood score, our data showed that mothers tended to experience more fatigue than fathers (*p* < 0.01). However, no gender differences were found for the

**Table 1.** Parent and child characteristics

	Parents	Children responding	Children non-responding	<i>p</i> -value*
N	123	67	68	
Gender, N (%)				0.66
Male	58 (47%)	36 (54%)	34 (50%)	
Female	65 (53%)	31 (46%)	34 (50%)	
Age, years	38.0 ± 6.7			
Primary caregiver, N (%)				
Yes	120 (98%)			
No	3 (2%)			
Biological parent, N (%)				
Yes	122 (99%)			
No	1 (1%)			
Educational achievement, N (%)				
Primary	2 (2%)			
Secondary	74 (60%)			
High	46 (37%)			
Work status, N (%)				
Employed	100 (81%)			
Housewife/ houseman	20 (16%)			
Unemployed	1 (1%)			
Other	2 (2%)			
Time between diagnosis and completion questionnaire, weeks	5.2 ± 3.9			
Diagnosis				0.07
Hematological malignancy		50 (75%)	36 (53%)	
Extra cranial solid tumor		9 (13%)	19 (28%)	
Brain tumor		6 (9%)	10 (15%)	
LCH		2 (3%)	3 (4%)	
Age at diagnosis, years		5.9 ± 4.6	6.7 ± 4.4	0.23

LCH, Langerhans Cell Histiocytosis.

Data are represented as number (frequency) and mean ± standard deviation;

\*Differences between responding and non-responding group.

subscales depression (*p* = 0.08), anxiety (*p* = 0.12), anger (*p* = 0.61), and vigor (*p* = 0.68).

The included parents had a median parenting stress score of 51 [25–140]. No differences were found between the parenting stress scores of fathers and mothers (52 [25–115]; 51 [25–140], *p* = 0.46).

Parents rated the total child behavior problems as 26 [1–108]. An overview of the behavioral and emotional problems of the child is presented in Table 2. Of the potential covariates, younger parental age (*p* < 0.01) and younger age of the child at diagnoses (*p* < 0.01) were both related to more child behavior problems and therefore included in the mediation analysis as covariates. Parental gender (*p* = 0.57), primary carer (*p* = 0.37), biological parent (*p* = 0.26), educational achievement (*p* = 0.22), work status (*p* = 0.21), time between diagnosis and completion of the questionnaire (*p* = 0.29), gender of child (*p* = 0.11), and diagnosis (*p* = 0.08) did not influence child behavior problem scores.

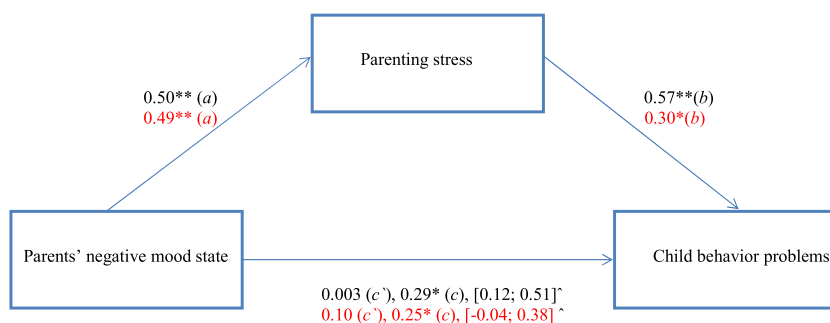
**Table 2.** Child behavior problems

	Child behavior problems	Observed score median [range]	
1.5–5 years	Emotionally reactive	3.2 [0.0–12.0]	
	Anxious-depressed	2.0 [0.0–13.0]	
	Somatic complaints	2.5 [0.0–14.0]	
	Withdrawn	2.0 [0.0–10.0]	
	Attention problems	1.0 [0.0–7.0]	
	Aggressive problems	8.0 [0.0–24.0]	
	Sleep problems	2.0 [0.0–9.0]	
	Other problems	9.0 [0.0–36.0]	
	Internalizing behavior problems	11.0 [0.0–39.0]	
	Externalizing behavior problems	9.0 [0.0–28.0]	
	Total CBCL score	33.0 [2.0–108.0]	
6–18 years	Anxious-depressed	2.0 [0.0–12.0]	
	Somatic complaints	3.0 [0.0–12.0]	
	Withdrawn	2.0 [0.0–10.0]	
	Rule-breaking behavior	0.0 [0.0–11.0]	
	Attention problems	3.0 [0.0–13.0]	
	Aggressive problems	2.0 [0.0–14.0]	
	Social problems	1.0 [0.0–9.0]	
	Thought problems	2.0 [0.0–10.0]	
	Other problems	4.0 [0.0–10.0]	
	Internalizing behavior problems	8.0 [0.0–24.0]	
	Externalizing behavior problems	3.0 [0.0–25.0]	
		Total CBCL score	21.0 [1.0–68.0]

Parents' negative mood state and parenting stress were moderately correlated ( $r=0.49$ ,  $p < 0.01$ ). Parents' negative mood state had a low correlation with child behavior problems ( $r=0.31$ ,  $p < 0.01$ ), whereas more parenting stress was strongly related to child behavior problems ( $r=0.61$ ,  $p < 0.01$ )

### Mediation

We designed the first mediational model with the purpose to investigate the mediating effect of parenting stress on the association between parents' negative mood state and child behavior problems. Results of the individual models, designed for fathers and mothers, are presented in Figure 1.



Pathway values represent unstandardized regression coefficients, and are illustrated in black for fathers, and in red for mothers. Pathway *c* represents the total effect of parents' negative mood state on child behavior problems before including parenting stress. Pathway *c'* represents the direct effect of parents' negative mood state on child behavior problems after including parenting stress. \*  $p < 0.05$ –0.01, \*\*  $p < 0.01$ , ^ = bias corrected and accelerated confidence intervals for the indirect effect (*c-c'* pathway). Corrected for the child's age at diagnosis and parental age.

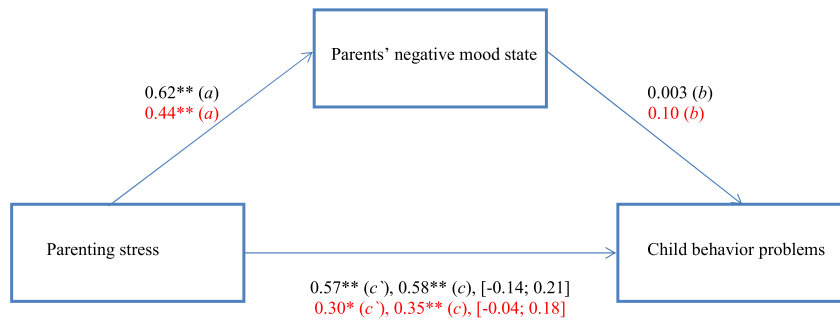
**Figure 1.** Results of the mediation analyses (I)

In this model, pathway *a* represents the relationship between parents' negative mood state and parenting stress, pathway *b* represents the relationship between parenting stress and child behavior problems, and pathway *c* represents the relationship between parents' negative mood state and child behavior problems. The relationship between parents' negative mood state and child behavior problems (total effect) became non-significant after mediating for parenting stress in both fathers ( $c' = 0.003$ ,  $p = 0.98$ , direct effect) and mothers ( $c' = 0.10$ ,  $p = 0.42$ ). However, data showed that the indirect effect of parents' negative mood state and child behavior problems was significant for fathers (95% CI [0.12; 0.51]) but not for mothers [−0.04, 0.38], indicating that parenting stress only mediates the association for fathers.

To investigate the mediating effect of parents' negative mood state on the relation between parenting stress and child behavior problems, we designed our second model. Results of the individual models, designed for fathers and mothers, are presented in Figure 2. The association between parenting stress and child behavior problems remained significant after mediating for parents' negative mood state in both fathers ( $c' = 0.57$ ,  $p < 0.01$ ) and mothers ( $c' = 0.30$ ,  $p = 0.02$ ). The indirect effect was not significant, with a 95% CI of [−0.14; 0.21] for fathers and [−0.04; 0.18] for mothers. These results indicate that parents' negative mood state does not mediate the association between parenting stress and child behavior problems.

### Discussion

The results of the study have shown that both parents' negative mood state and parenting stress are associated with behavior problems in children with newly diagnosed cancer, which is in line with previous studies [20–22,26–28]. This study adds to literature by showing that for fathers, the association between parents' negative mood state and child



Pathway values represent unstandardized regression coefficients and are illustrated in black for fathers, and in red for mothers. Pathway *c* represents the total effect of parenting stress on child behavior problems before including parents' negative mood state. Pathway *c'* represents the direct effect of parenting stress on child behavior problems after including parents' negative mood state. \* $p=0.05-0.01$ , \*\* $p < 0.01$ , ^=bias corrected and accelerated confidence intervals for the indirect effect (*c-c'* pathway). Corrected for the child's age at diagnosis and parental age.

**Figure 2.** Results of the mediation analyses (II)

behavior problems was mediated by parenting stress, whereas for mothers this association was not present.

The importance of parenting stress in mediating the relationship between negative mood state is in line with studies emphasizing parenting stress, as well as actual parenting behavior as having a more direct effect on the child's behavior [40–42]. The stress that parents experience through the cancer diagnosis might affect their ability to parent their child effectively. It may be the case that parents are challenged in their thoughts of what constitutes good parenting in these circumstances. It is possible that parenting stress decreases once more of an equilibrium is found in the family system, as research has shown that parenting stress decreases over time in parents of a child with cancer [6].

Regarding gender differences, in the current study, we found neither differences in the total mood score between fathers and mothers nor any differences between fathers and mothers in terms of average levels of parenting stress shortly after diagnosis. These findings are in line with studies comparing gender differences in psychological measures in childhood cancer, such as depression, anxiety, and symptoms of post-traumatic stress, and reported no gender differences [8,29–31]. However, for fathers, parenting stress mediated the association between parents' negative mood state and child behavior problems. The mediational role of parenting stress for fathers may emphasize differences in relationships. Although changes in society have resulted in more involvement in care from fathers [51], a mother's relationship with their child is traditionally less open to choice, whereas fathers have been afforded more discretion in their relationship [51]. This in turn may amplify interactional strains between father and child, highlighting the complexity of these relationships. Research on the domain of parent–child relationships has shown, for instance, how child characteristics, such as temperament, can play out differently with fathers compared with mothers [52]. In addition, a review of the literature highlighted that mothers and fathers differed in terms of coping strategies,

with fathers using more problem-focused strategies and mothers using more emotion-focused strategies [53]. Fathers were also less frequently engaged in social-support seeking strategies and received less social support than mothers [53]. These differences may also contribute to issues in parenting domains that fathers may encounter.

Younger children in the current study were at a higher risk to develop behavior problems, which is in line with a study that showed that children younger than 12 years had more psychosocial and behavioral problems than adolescents with cancer [6]. An age-dependent increase of coping capacities as well as a greater variety of different coping strategies may explain our finding [54]. In addition, younger parental age was also associated with more reported child behavior problems. Previously, Morrow and colleagues also showed that younger parents have more problems with coping with their child's illness compared with older parents [55]. They suggest that this might be caused by the development of a more stable social network over time and financial sources [55].

Several limitations of our study are important to take into account when interpreting the findings. The cross-sectional design of our study excludes the possibility to draw any definite conclusion about the direction of the correlation between parents' negative mood state, parenting stress, and child behavior. Although we found that parenting stress mediates child behavior problems, it might also be that parenting stress is a result of child behavior problems [56]. Moreover, partly due to the inclusion criteria, 75% of children were diagnosed with leukemia, and only a small number of parents had a child with a solid or brain tumor, which raises the question of the generalizability of our results. We suggest that findings in our study apply to parents caring for a child diagnosed with cancer as an outpatient. Another limitation is related to the means of recruitment, whereby some fathers or mothers were asked by proxy by their partner as not both parents attended the outpatient clinic at the same time, during recruitment. Lastly, a limitation

of our study was the use of single reporter questionnaires only, which could have resulted in shared method variance, and shared-informant variance.

In terms of clinical applications, it is worth developing interventions specifically for parents shortly after their child has been diagnosed with cancer. This would be aimed at prevention of potential problems in the future [57], as some parents develop posttraumatic stress symptoms [12], while also giving parents the tools to implement behavioral interventions to try and normalize the child's life as much as possible given the circumstances [58]. Potential interventions would center on reducing parenting stress through cognitive-behavioral interventions, such as improving problem solving skills [59]. Our findings suggest there might be merit in focusing on interventions for fathers and mothers, while taking into account the different experiences of fathers and mothers in terms of their role and coping strategies for instance. In-depth knowledge of the issues that drive fathers, as has been suggested elsewhere [53], would be beneficial in shaping interventions that take these differences into

account. Moreover, in the future, it is worth exploring the role of parenting stress in relation to the child's behavior, taking into account other parenting capacity variables, such as parental overprotection and perceived child vulnerability, and actual parenting behavior [40,60].

In conclusion, consistent with previous studies, we found that parents' negative mood state and especially parenting stress are important variables that influence the behavior of a child with newly diagnosed cancer. This is the first study to demonstrate the mediational role of parenting stress in fathers on behavior problems of a child with newly diagnosed cancer. Our results highlight the need for a longitudinal study that explores the value of an early intervention that focuses on reducing parenting stress, to improve adjustment for both the parents and child.

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