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## Chapter 5

# Moderators of the Efficacy of a Psychosocial Group Intervention for Children with Chronic Illness and their Parents: For Whom Does it Work Best?

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## ABSTRACT

**Background:** The objective of this study was to investigate psychosocial characteristics of children and parents as well as parent-child relationships as moderators of the effect of a cognitive behavioral group intervention for children with chronic illness and their parents.

**Methods:** Data from a randomized controlled trial were used, including 194 children (8-18 years) who were assigned to a child-only intervention, a parent-child intervention or a waitlist control group. Moderator variables included age, gender, baseline behavior problems, coping style, self-worth, the security of the parent-child relationship and parenting stress. Longitudinal multilevel regression analyses were performed to test two- and three-way interaction effects between the moderator variables, study-group, and time on parent and child reported internalizing and externalizing behavior problems.

**Results:** Analyses revealed that for children with a more disengaged coping style, with lower self-worth, and for children who experienced a more secure parent-child relationship, the parent-child intervention was more effective than the child-only intervention in reducing behavior problems.

**Conclusions:** Children who are more 'at risk' appear to gain more from participating in the intervention, especially if their parents are involved as well. However, benefit of parents' involvement may depend on the quality of the parent-child relationship.

**Key words:** chronic illness; children; intervention; psychosocial adjustment; moderators; coping; self-worth, parent-child relationship; parenting stress

## INTRODUCTION

Children with chronic illness (CI), such as asthma, diabetes, and arthritis, are at elevated risk of behavior problems (Barlow & Ellard, 2006; Piquart & Shen, 2011). During the last decades, studies have suggested that adjustment in children with chronic illness may be promoted using cognitive behavioral therapeutic techniques (Barlow & Ellard, 2004; Beale, 2006; Thompson, Delaney, Flores, & Szigethy, 2011). Others have argued that adjustment problems of children with CI develop in the context of family resilience and stress (Wallander & Varni, 1998), and therefore interventions should have components that include parents (Beale, 2006; Eccleston, Palermo, Fisher, & Law, 2012; Thompson et al., 2011). Little is known, however, about the efficacy of multi-component interventions for children and parents with different types and levels of risk and resilience (La Greca, Silverman, & Lochman, 2009), limiting the development of practices that tailor interventions to individual needs and strengths (Scott & Dadds, 2009; Weisz et al., 2012).

A first efficacy study of a cognitive behavioral group intervention for a heterogeneous population of children with various chronic illnesses showed small to moderate positive effects on active coping skills and behavior problems (Scholten et al., 2013, Chapter 4). Adding a parallel program for parents to teach them to motivate their children to apply the learned skills in everyday life enhanced the effects in some of the outcomes. To further investigate intervention effects and to identify which protocol (child-only versus parent-child) works best for whom, it is essential to study pre-treatment risk- or resistance factors as moderators (Hinshaw, 2007; Simon & Perlis, 2010).

Transactional models of child adaptation to chronic illness identify numerous illness, child, and family risk factors (Kazak, 2006; Thompson & Gustafson, 1996; Wallander & Varni, 1998). Neither in our RCT (Scholten et al., 2013), nor in other intervention studies (Kibby et al., 1998) illness factors, such as illness severity and illness type moderated intervention outcomes. Child and family factors, such as coping style, parenting stress levels and parent-child relationships, are therefore potentially more relevant, especially those factors that may itself be amenable to intervention.

Disengaged coping strategies such as self-criticism and social withdrawal (Compas et al., 2006; Spirito et al., 1994), and low self-worth (Schuengel et al., 2006; Simon, Barakat, Patterson, & Dampier, 2009) have been found associated with anxiety and sadness among children with chronic illness. Based on these findings, psychosocial interventions for children with CI focus on active coping skills (Scholten et al., 2011), and may therefore be more effective for children who do not already have active, engaged coping strategies and positive self-perceptions.

Internalizing problems in children with CI have been found associated with insecure parent-child relatedness (e.g., Bleil et al., 2000) and parenting stress (e.g., Mullins et al., 2004). Furthermore, parenting stress appeared to interfere with the effects of cognitive behavioral interventions for children with anxiety disorders (Crawford & Manassis,



2001). Interventions that involve parents may target parenting stress by increasing parental understanding and skills for supporting their child, enhancing intervention effectiveness for children with highly stressed parents. However, insecurity in the parent-child relationships may be more difficult to address with cognitive behavioral group interventions, given its developmental roots (Ainsworth, 1979).

In sum, greatest improvements in adjustment to CI may be expected for children who have the most to learn from the group intervention (e.g., Hautmann et al., 2010), that is who have a disengaged coping style and a lower self-worth. Furthermore, the parent component may be especially effective for the most distressed parents. However, parental encouragement of child engaged coping strategies and positive self-perception might be more successful in emotionally secure, good quality relationships. Therefore, we expect that our parent-child intervention is more effective for families with secure emotional relationships.

Because age, gender, and baseline level of behavior problems have been found to moderate intervention outcome in previous studies (Barret, 1998; Kibby et al., 1998; Weisz, Weiss, Han, Granger, & Morton, 1995), we also considered these variables as potential moderators. However, because the intervention was designed to be suitable for boys and girls of different ages, we expected that the intervention was effective for both boys and girls of all ages. With regard to baseline level of problems we expected moderator effects to be in the same direction as coping style and self-worth, with more risk (higher level) leading to more improvement.

## **METHODS**

### **Design**

Participants came from a multicenter randomized controlled trial that was designed according to the Consolidated Standards of Reporting Trials statement (Schulz et al., 2010). Full details of the protocol, and the efficacy were previously described (Chapter 3 and 4). Study participants were assigned randomly to a child-only intervention, a parent-child intervention or a waitlist control group. Assessments were at baseline (T0), 6 months (T1), and 12 months (T2) follow-up. Subject retention to study completion was 82% (see Chapter 4 for details of participant screening and randomization).

### **Participants and procedures**

Participants were recruited from outpatient clinics of three academic hospitals, four nonacademic hospitals, and from two primary schools for children with CI in the Netherlands. Children and parents received an information letter and a reply-form from their pediatrician. Participants were eligible for the study if they (a) were diagnosed with a chronic physical illness (van der Lee et al., 2007); (b) were between 8 and 18

years of age; (c) were able to independently fill out the questionnaires; (d) had no severe learning difficulties. A total of 194 children were randomized into one of the study-groups. Children's ages ranged from 7.52 to 18.07 years (mean age = 12.03 years,  $SD = 2.68$ ); 50% were girls. The majority of the children and their parents were born in the Netherlands ( $n = 133$ ; 69%), had a medium to high income ( $n = 137$ ; 70%), and lived in a two-parent household ( $n = 155$ ; 80%). Children were under medical care for 45 different diagnoses. The five most common diagnoses were: type 1 diabetes ( $n = 57$ ; 29%), auto-immune diseases ( $n = 24$ ; 12%), kidney disease ( $n = 24$ ; 12%), inflammatory bowel disease ( $n = 19$ ; 10%), and asthma ( $n = 18$ ; 9%).

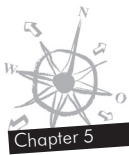
## Interventions

Children in both intervention groups received the same group course consisting of six weekly 90-minute sessions, and a booster session after 6 months, with four to eight participants per group ( $M = 5.04$ ,  $SD = 0.89$ ). Two qualified psychologists carried out the course, based on a detailed manual. All psychologists ( $n = 35$ ) were extensively trained in the protocol. Five coping strategies were taught: 1) seeking and giving information about the disease, 2) using relaxation techniques during stressful situations, 3) increasing knowledge of self-management and medical compliance, 4) improving social competence, and 5) positive thinking. Two slightly different versions of the protocol were developed, one for children at primary school age (8–12 years old) and another for adolescents (12–18 years old).

The parent component consisted of six 90-minute sessions parallel to the child sessions, also led by two psychologists, and based on a detailed protocol. Parents were reinforced in sensitively attending to their child's needs, and in encouraging their child to use the taught coping strategies. All sessions took place in the hospital/school where the child was recruited. A detailed content of the interventions is described in our previous publications (Last et al., 2007; Scholten et al., 2011). Participants in the waitlist control group were invited to take part in the intervention after the final follow-up assessment at 12 months.

## Outcome measures

*Behavior problems* were assessed with the Parent Report Form (PRF; 4–18 years) of the Child Behavior Checklist, and the Youth Self Report (YSR; 11–18 years) (Verhulst, 1996; Verhulst, 1997). Questionnaires consisted of 120 (PRF) and 119 (YSR) problem items, and a three-point Likert scale (from 0 indicating "not true" to 2 indicating "very true or often true," considering behavior during the past six months). We used the two broadband scales; "Internalizing Problems" and "Externalizing Problems". The "Internalizing Problems" scale (range: 0–42) included the subscales "Anxious/depressed" and "Withdrawn/depressed". Items from the subscale "Somatic Complaints" were disregarded in the analysis given the nature of the sample (Perrin et al., 1991).



The Externalizing Problems scale (PRF range: 0–70, YSR range: 0–64) included the subscales “Rule-breaking behavior” and “Aggressive behavior”. Raw scale scores were used in the analyses. Higher scores indicate more problems. For descriptive purposes, T scores were computed from the raw scale score, to indicate the percentages of children scoring within the subclinical or clinical range. A T score of 63 (90th percentile in the norm population) demarcates the clinical range, which is an indication that a child has clinically relevant symptoms and needs professional help. Internal consistency for the PRF and YSR internalizing and externalizing scales in the current sample ranged from Cronbach’s  $\alpha = .84$  to  $\alpha = .91$ .

## Moderators

*Baseline severity of behavior problems* was measured using the baseline scores on self- and parent-reported internalizing and externalizing problems (PRF and YSR).

*Child disengaged coping* was measured using an adapted version of the Coping Strategies Inventory (CSI). The CSI is a self-report questionnaire, and assesses coping thoughts and behaviors in response to a specific stressor (Tobin, 1991). A 32-item version is widely used (Madanswain et al., 1994), and validated in pediatric literature (Blount et al., 2008). Using the items with the highest factor loadings, a short (10-item) version was constructed, and translated into Dutch using a backward-forward method. Children were asked to describe a specific stressful event and to evaluate different responses to this event on a 5-point scale ranging from “I never do this” to “I always do this”. For the current study we used the disengaged coping scale which consists of two responses that reflect self criticism (e.g., “I blamed myself”), two that indicate social withdrawal (e.g. “I avoided being with people”), and one that reflects wishful thinking (“I wished it never happened”). A higher score indicates more use of disengaged coping. Internal consistency in the current sample was acceptable (Cronbach’s  $\alpha = .62$ , 5 items) and comparable to other studies (Addison et al., 2009).

*Self-worth* was assessed with the global self-worth subscale of the Perceived Competence Scale for Children (8-12 years) and the Perceived Competence Scale for Adolescents (12-18 years) (Harter, 1982; Treffers et al., 2002; Veerman et al. 1997). The child version consists of 6 items, and the adolescent version consists of 5 items (e.g., ‘Some children are happy with themselves’ versus ‘Other children would like to be someone else’). Children first had to decide which of the items in the pair described them best, and then they had to choose between ‘sort of true’ or ‘really true’. A higher score indicates higher self-worth. Adequate reliability and content validity in samples of children with and without illnesses has been reported (Treffers, 2002; Veerman, 1997). Internal consistency in the current sample was satisfactory (for the child-version Cronbach’s  $\alpha = .78$ , and for the adolescent-version  $\alpha = .89$ ).

*Emotional security of the parent-child relationship* with the parent involved in the study was measured using the Child Security Scale (CSS) (Kerns et al., 2001). The CSS consists of 15 items on a 4-point Likert scale (from “fully agree” to “fully disagree”) from

three domains: availability (perceived responsiveness and accessibility of the attachment figure), reliability (tendency to rely on attachment figure during stressful times), and communication (perceived ease and interest in communicating with attachment figure). This measure has good psychometric properties (Kerns et al., 2001). Internal consistency of the total score, used in the present study, was satisfactory (Cronbach's  $\alpha = .81$ ).

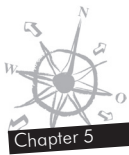
*Parenting stress* was assessed using the short Dutch version of the 'Parenting stress Index' (PSI; De Brock, Vermulst, Gerris, & Abidin, 1992). Fourteen items referred to parental characteristics (e.g., efficacy, depression) within the care-giving context, and were rated on a 6-point scale ranging from 1 (disagree very much) to 6 (agree very much). An example of a question is: 'I notice that I am not as capable in caring for my child as I thought'. A higher score indicated more parenting stress. The internal consistency of this scale was adequate in the current study (Cronbach's  $\alpha = .86$ ).

## Data analyses

Multi-level analyses were performed on an intention-to-treat basis. The longitudinal design of this study, together with the nested data structure of children within intervention groups and centers (hospital/school), required multilevel analysis. The mixed models procedure in SPSS20.0 was used. Intraclass correlations indicated dependency within measurement occasions ( $ICC > .05$ ), but not within intervention groups and centers.

Data were analyzed using a maximum-likelihood estimation procedure, with parent- and child reported internalizing and externalizing problems as outcome variables. The continuous moderator variables (age, baseline behavior problems, coping, self-perception, parent-child relationship and parenting stress) were mean-centered to avoid multicollinearity in the interaction terms (Aiken & West, 1991).

A stepwise procedure was used to model individual growth curves following the recommendations of Singer and Willet (2003) (see also Chapter 4), and the same procedure was repeated for each of the outcome variables separately. In Step 1, an empty model with an autoregressive within-subjects (co)variance structure was fitted to the data. In Step 2, time (assessment occasion) was added as a random effect to model individual growth curves. We expected a stronger decrease in behavior problems during the intervention period than during the follow-up period; therefore, a quadratic effect of time was added to the linear effect of time. In Step 3, background variables were added as fixed effects, and were subsequently removed if found to be not significantly related to the mean level or change in the dependent variables (see Scholten et al., 2013). In Step 4, study-group and the interaction between group and time were entered into the model. Step 5 tested the main effects of the moderators and the two-way interactions between moderators and time, and between moderators and study-group. Because of power limitations, each moderator was tested in a separate model. The final step (Step 6) tested the three-way interaction between moderator, study-group and time. Steps 4 to 6 were carried out twice to find out for which study-group the results yield. At each step, differences in fit between models were evaluated using the  $\chi^2$  difference test for





deviance values (-2 Log-Likelihood). Progression through the steps was based on the significance of the  $\chi^2$  difference test. Only if the model fit improved, the multivariate statistics of the moderators were interpreted. An alpha of .05 was used to test the statistical significance of the effects. To probe the significant three-way interaction effects, two-way interactions of study-group\*time were plotted for children with low versus high scores on the moderator (using a median split). Explained variances of the moderators including the main effects and two and three-way interactions were computed by dividing the total variance of the step 6 models by the variance of the step 5 model (study-group), and subtracted from 1 (Snijders & Bosker, 2004). Given the value of  $R^2$ , Cohen's  $f^2$  was calculated to indicate the effect size. Effect sizes of  $\leq 0.02$  were considered small, effect sizes of approximately 0.15 were considered moderate, and effect sizes of approximately 0.35 were considered large (Cohen, 1988). Post hoc power calculations were adequate for the models that tested three-way interactions for parent-reported internalizing and child-reported externalizing problems (.76-.96), but somewhat lower for parent-reported externalizing problems (.67) and self-reported internalizing problems (.49).

## RESULTS

### Preliminary analysis

Table 5.1 shows the means and standard deviations of the outcome variables and of the potential moderators at baseline. Despite randomization, there were significant differences between study-groups in age, illness severity, parenting stress, parent-reported internalizing scores at baseline, and setting (academic hospital versus

**TABLE 5.1** Means, Standard Deviations and Range of Outcome variables and Potential Moderators at Baseline

	<i>N</i>	<i>Range</i>	<i>Mean</i>	<i>SD</i>
<b>Outcomes</b>				
PRF Internalizing <sup>1</sup>	178	0-37	10.98	7.73
PRF Externalizing	178	0-35	8.42	7.21
YSR Internalizing <sup>1</sup>	110	1-33	9.91	6.77
YSR Externalizing	110	0-27	8.28	5.88
<b>Potential moderators</b>				
Age	194	7.5-18	12.03	2.68
Disengaged coping	184	4-20	10.17	3.34
Self-perception	186	1-4	3.13	0.73
Parent-child relationship	171	38-75	62.11	7.65
Parenting stress	176	10-49	18.88	8.05

PRF = Parent Report Form, YSR = Youth Self Report

<sup>1</sup>Excluding the "somatic complaints" scale.

non-academic hospital). Because setting and illness severity were also significantly positively associated with the level of parent-reported internalizing problems, and age and illness severity with the level of self-reported internalizing problem, we controlled for those variables in the multilevel analyses.

Percentages of internalizing baseline problems within clinical range were 43% based on parental report, and 10% based on self-report. Externalizing baseline problems within clinical range were 27% based on parental report, and 9% based on self-report. These levels of problems are comparable with behavior problems reported for children with chronic illnesses in other studies (Pinquart & Shen, 2011).

## Moderator Analyses

As described earlier (Chapter 4), positive effects of study-group (Step 4) were found on parent-reported internalizing problems and self-reported externalizing problems, but not on parent-reported externalizing and self-reported internalizing problems. The addition of two- and three-way interactions with the moderators (Step 5 and 6) significantly improved the model fit ( $p < .0001$ ) for all the four outcomes, except for age and gender as moderators. Therefore, the models with age and gender will not be further described.

The three-way interaction effects of study-group, time and the potential moderators showed that baseline child disengaged coping, self-worth, and the security of the parent-child relationship significantly moderated the effect of the intervention (study-group) on the change in behavior problems over time. The final models (step 6) are reported in Table 5.2. The significant two- and three- way interactions of the moderators with study-group are described in the next paragraphs. Baseline behavior problems and parenting stress did not significantly moderate the effect of study-group on any of the outcome variables, and therefore these results will not be further described.

## Coping

More use of disengaged coping predicted a higher mean level of internalizing problems and a stronger decrease in internalizing problems over time, regardless of study-group. A two-way moderator by study-group effect of baseline child disengaged coping on parent-reported internalizing problems was found (Table 5.2), indicating that the effect of study-group on the mean level of internalizing problems was different for children scoring high versus low on disengaged coping (child-only vs waitlist, and parent-child vs child-only), regardless of time. The 3-way interaction between (disengaged coping\*study-group \*time) was significant for the linear change (Table 5.2) as well as the curvilinear change (not presented in Table 5.2) in parent-reported internalizing problems over time. The significant interaction effect on the linear change indicated that for children high on disengaged coping, the child-only intervention resulted in a stronger decrease in internalizing problems than the parent-child intervention (Figure 5.1-a), and the waitlist-



**TABLE 5.2** Parameter Estimates for Multilevel Models with Moderators Predicting Parent- and Child-reported Internalizing and Externalizing Problems: separate models with disengaged coping, self-perception, and emotional security of the parent-child relationship as moderator

Parameters	Disengaged Coping					
	PRF Internalizing <sup>1</sup>			YSR Externalizing		
	<i>B</i>	<i>S.E.</i>	<i>p</i>	<i>B</i>	<i>S.E.</i>	<i>p</i>
Intercept	-4.804	4.278	0.262	8.104	1.067	0.000
Setting	12.104	4.301	0.005	-	-	-
Illness severity	0.905	0.207	0.000	-	-	-
Age	-	-	-	-	-	-
Study-group						
Child-only vs Waitlist	7.041	2.745	0.011	0.799	1.539	0.604
Parent-child vs Child-only	-5.304	2.991	0.077	0.646	1.615	0.689
Parent-child vs Waitlist	1.736	2.895	0.549	1.446	1.586	0.363
Time	9.12	4.691	0.037	-0.589	0.339	0.584
Time * Study-group <sup>2</sup>						
Child-only vs Waitlist	-7.389	3.053	0.016	0.398	0.486	0.415
Parent-child vs Child-only	6.928	3.314	0.037	-1.191	0.490	0.016
Parent-child vs Waitlist	-0.461	3.203	0.886	-0.794	0.484	0.103
Moderator	<b>1.807</b>	0.607	0.003	0.103	0.232	0.656
Moderator * Time	<b>-1.746</b>	0.684	0.011	<b>0.171</b>	0.072	0.019
Moderator*study-group						
Child-only vs Waitlist	<b>2.495</b>	0.834	0.003	0.102	0.334	0.761
Parent-child vs Child-only	<b>-1.827</b>	0.882	0.039	0.674	0.355	0.059
Parent-child vs Waitlist	0.669	0.859	0.437	<b>0.776</b>	0.349	0.027
Moderator * time * study-group						
Child-only vs Waitlist	<b>-2.457</b>	0.935	0.009	0.092	0.105	0.380
Parent-child vs Child-only	<b>2.454</b>	0.986	0.013	<b>-0.242</b>	0.104	0.021
Parent-child vs Waitlist	-0.003	0.955	0.997	-0.150	0.106	0.159

PRF = Parent Report Form, YSR = Youth Self Report.

*B* = unstandardized coefficient; *S.E.* = standard error.

Significant moderator effects are in bold for ease of reference.

<sup>1</sup> Excluding the "somatic complaints" items.

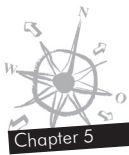
<sup>2</sup> Quadratic effect of time not presented in the table

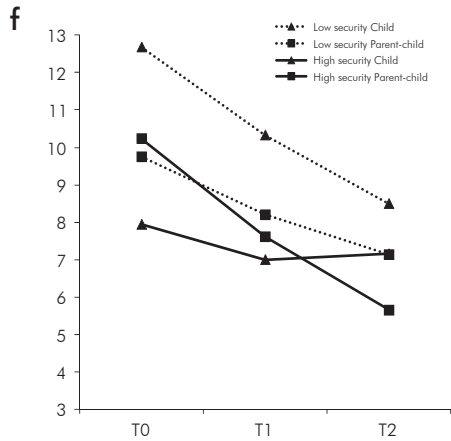
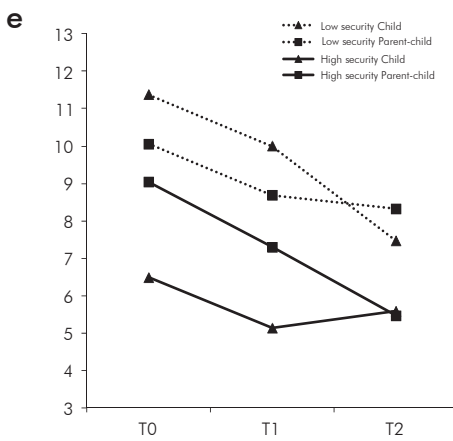
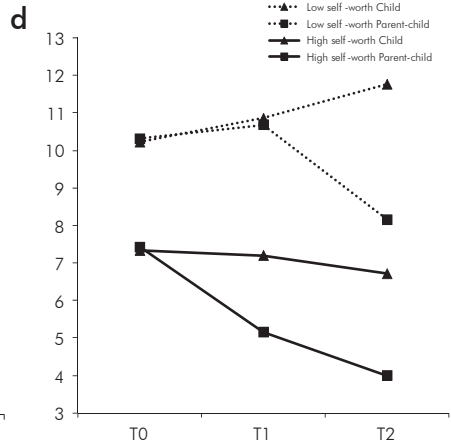
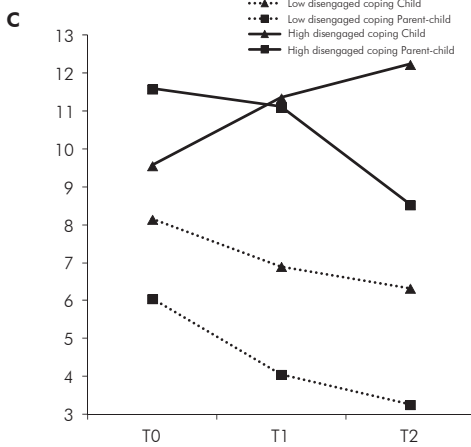
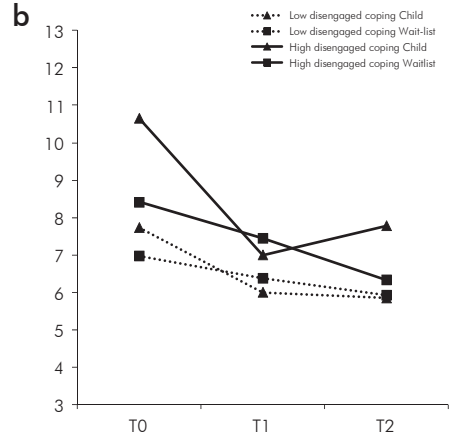
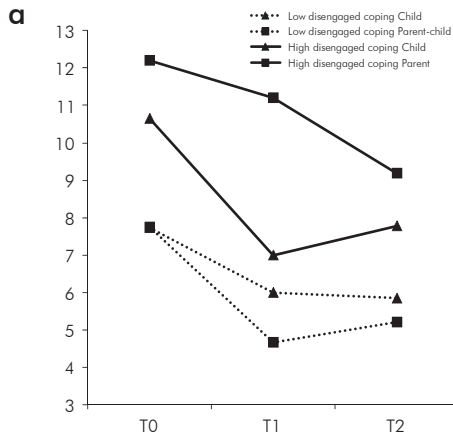
group (Figure 5.1-b), while for children low on disengagement differences between study-groups were less pronounced. However, as shown in Figure 5.1-a, the interaction on the curvilinear change indicated that in children high on disengaged coping it was found that in the child-only intervention internalizing problems increased again in the second half year (6-month to 12-month follow-up; child-only versus waitlist:  $B = .599$ ,  $p = .011$ ; Figure 1-b) while the problems continued to decrease in the parent-child intervention group (parent-child versus child-only:  $B = -.631$ ,  $p = .011$ ). In children low

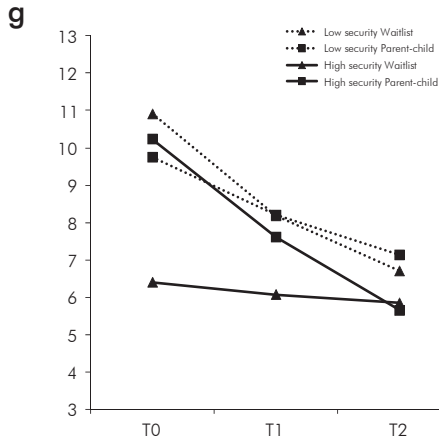
Self Perception			Emotional security of the relationship					
YSR			PRF			YSR		
Externalizing			Externalizing			Internalizing <sup>1</sup>		
B	S.E.	p	B	S.E.	p	B	S.E.	p
8.073	1.054	0.000	4.747	1.544	0.002	-2.350	3.387	0.471
-	-	-	-	-	-	-	-	-
-	-	-	0.598	0.279	0.033	0.571	0.280	0.043
-	-	-	-	-	-	0.739	0.235	0.002
0.633	1.523	0.678	2.175	1.355	0.110	0.677	1.611	0.675
1.261	1.597	0.430	0.379	1.459	0.795	-0.454	1.709	0.791
1.894	1.566	0.228	2.554	1.446	0.078	0.223	1.655	0.893
-0.712	0.337	0.036	-0.709	0.271	0.009	-1.114	0.381	0.004
0.610	0.481	0.206	-0.417	0.394	0.291	0.175	0.556	0.753
-1.306	0.482	0.007	0.150	0.413	0.717	-0.461	0.562	0.413
-0.696	0.478	0.147	-0.268	0.402	0.507	-0.286	0.544	0.600
-1.372	1.530	0.370	<b>-0.366</b>	0.115	0.002	-0.249	0.133	0.061
<b>-1.453</b>	0.432	0.001	<b>0.078</b>	0.033	0.019	0.071	0.046	0.121
0.047	2.100	0.982	-0.104	0.178	0.559	-0.052	0.206	0.800
-0.647	2.048	0.752	0.136	0.182	0.456	0.205	0.201	0.308
-0.600	2.113	0.777	0.032	0.196	0.869	0.153	0.219	0.485
-0.819	0.634	0.198	0.019	0.052	0.716	-0.028	0.073	0.703
<b>1.215</b>	0.614	0.049	<b>-0.122</b>	0.052	0.020	<b>-0.137</b>	0.068	0.046
0.396	0.636	0.534	-0.103	0.057	0.070	<b>-0.165</b>	0.076	0.030

on disengaged coping problems increased in the second half year in both the child-only and parent-child intervention. The moderation effects explained 6.2% of the variance, with an effect size of  $f^2 = .066$ . The final model with disengaged coping as moderator explained 17.7% of the variance of parent-reported internalizing problems.

Significant moderation effects of baseline disengaged coping were also found for self-reported externalizing problems (Table 5.2). More use of disengaged coping predicted a stronger increase in externalizing problems over time regardless of study-group (moderator\*time). In addition, a moderator by study-group effect was found, indicating that the effect of study-groups on the mean level of externalizing problems was different for children scoring high versus low on disengaged coping. Finally, as illustrated in Figure 5.1-c, the change in externalizing problems over time







**FIGURE 5.1-a** parent reported internalizing problems of children with high versus low disengaged coping in the parent-child intervention compared to the child-only intervention at baseline, 6-month and 12-month follow-up.

**FIGURE 5.1-b** parent reported internalizing problems of children with high versus low disengaged coping in the child-only intervention compared to the waitlist group at baseline, 6-month and 12-month follow-up.

**FIGURE 5.1-c** self reported externalizing problems of children with high versus low disengaged coping in the parent-child intervention compared to the child-only intervention at baseline, 6-month and 12-month follow-up.

**FIGURE 5.1-d** self reported externalizing problems of children with high versus low self-worth in the parent-child intervention compared to the child-only intervention at baseline, 6-month and 12-month follow-up.

**FIGURE 5.1-e** parent reported externalizing problems of children with high versus low emotional security of the parent-child relationship in the parent-child intervention compared to the child-only intervention at baseline, 6-month and 12-month follow-up.

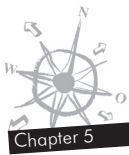
**FIGURE 5.1-f** self reported internalizing problems of children with high versus low emotional security of the parent-child relationship in the parent-child intervention compared to the child-only intervention at baseline, 6-month and 12-month follow-up.

**FIGURE 5.1-g** self reported internalizing problems of children with high versus low emotional security of the parent-child relationship in the parent-child intervention compared to the waitlist group at baseline, 6-month and 12-month follow-up.

for children in the parent-child intervention compared to the child-only intervention was moderated by disengaged coping (moderator\*study-group\*time). Children high on disengaged coping in the parent-child intervention showed a decrease in externalizing problems, while problems increased for children high on disengaged coping in the child-only intervention. In children low on disengaged coping, the change in problems over time seemed to be the same in the parent-child and the child-only intervention. The moderation effects explained 11.4% of the variance, with an effect size of  $f^2 = .13$ . The final model with disengaged coping explained 13.1% of the variance in self-reported externalizing problems.

### Self-worth

Self-worth significantly moderated the change in self-reported externalizing problems over time. Firstly, higher self-worth predicted a stronger decrease in externalizing



problems regardless of study-group (moderator\*time) (Table 5.2). Secondly, as illustrated in Figure 5.1-d, the change over time for children in the parent-child intervention compared to the child-only intervention was different for children with high compared to low baseline levels of self-worth (moderator\*study-group\*time). Children with low self-worth in the parent-child intervention showed a decrease in externalizing problems while children with low self-worth in the child-only intervention showed an increase in problems. In children with high self-worth, problems decreased over time in the parent-child intervention while no change in problems was seen in the child-only intervention. The moderation effects explained 12.4% of the variance, with an effect size of  $f^2 = .14$ . The final model with self-perception as moderator explained 14% of the variance.

### Security of the parent-child relationship

Emotional security of the parent-child relationship significantly moderated change in parent reported externalizing and self-reported internalizing problems (Table 5.2). Higher emotional security predicted a less strong decrease in problems over time, regardless of study-group (moderator\*time). Difference in the change of the outcomes over time between the study-groups was moderated by the baseline level of emotional security (moderator\*study-group\*time). As illustrated in Figure 5.1-e, children with high emotional security showed a stronger decrease in externalizing problems in the parent-child intervention than children with high emotional security in the child-only intervention, while for children with low emotional security the opposite was found. The moderation effects explained 5.3% of the variance, with an effect size of  $f^2 = .07$ . The final model with emotional security of the parent-child relationship explained 7.3% of the variance in parent-reported externalizing problems

Regarding the change in self-reported internalizing problems over time (moderator\*study-group\*time), for children with high emotional security the decrease was stronger in the parent-child intervention than in the child-only intervention and the waitlist group, while for children low on security the difference between the study-groups was less pronounced (Figures 5.1-f and 5.1-g). The moderation effects explained 4.6% of the variance, with an effect size of  $f^2 = .05$ . The final model with emotional security of the parent-child relationship explained 17% of the variance in self-reported internalizing problems.

## DISCUSSION

The present study provides first evidence of moderator effects of a cognitive behavioral group intervention for children with chronic illness and their parents. Findings revealed that effects of intervention modalities were moderated by child disengaged coping,

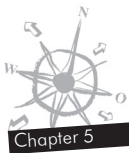
self-worth and the security of the parent-child relationship. In addition, we found that intervention effects were the same for both boys and girls, for children of all ages and for children with all levels of baseline problems. Also, the level of parenting stress that parents perceived at baseline did not influence the efficacy of the interventions.

Children who used a more disengaged coping style, and had lower self-worth benefited more than others from a parent-child intervention aimed at increasing the use of active coping strategies, and positive self perceptions. This finding is congruent with our hypothesis that greatest improvements may be found in children with low skills on the principles taught in the intervention, and may be explained by the fact that children with a disengaged coping style should learn coping strategies that are incongruent with their predominant coping style, to increase adaptability to a wide range of situations (Blount, Davis, Powers, & Roberts, 1991). An avoidant, disengaged coping strategy tends to leave stressors in place, and therefore acts as a risk-factor for psychosocial problems (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Thompson & Gustafson, 1996).

Children high on disengagement and low on self-worth benefited more from the parent-child intervention compared to the child-only group, especially on the long term. This finding is consistent with our hypothesis that these children would benefit more from an intervention that focused on engaged coping styles and positive self-worth if parents were also involved. Parental encouragement and reminding their children to use the new learned skills in everyday life might explain why parent-child intervention effects are larger and endure more on the long term. However, this explanation needs more evidence by studying parental encouragement and child skills as mediators of this effect.

For children who perceived a more secure relationship to the parent involved in the program we found that the parent-child intervention resulted in a larger decrease in problems over time. These findings are in line with our hypothesis that the parent-child intervention is more effective for parent-child dyads with secure emotional relationships, because parents are then more able to communicate with their children and encourage them to apply the learned skills in everyday life. These effects also suggest that children who, in turn, perceived the relationship with their parent to be less secure may need additional recourses. Perhaps, children with less secure parent-child relationship may benefit from additional treatment in which the parent and the child work together on communication and interaction.

Unexpectedly, we found no moderation effect of parenting stress. Although the level of parenting stress is known to influence child adaptation (Mullins et al., 2004) our findings suggest that children benefit from the intervention regardless of the level of stress perceived by their parents prior to the intervention. Unexpected was as well that children of parents with high parenting stress would benefit the most from the parent-child intervention. There is some evidence that educating parents in child management techniques and parent-child communication is effective in reducing parenting stress





(Deater-Deckard, 1998; Telleen, Herzog, & Kilbane, 1989). In this light, parenting stress may be more a mediator than a moderator of intervention outcome.

Results should be interpreted in light of several limitations. First, moderator effect sizes were small and, although we used multilevel modeling, models for security of the parent-child relationship as moderator had insufficient power. These problems are reported in many moderation studies (Hinshaw, 2007). Second, with the many analyses performed, false positives are a possibility. However, correction for multiple testing would have further lowered statistical power for testing moderation effects. Given the early stage of this field, these findings might lead to more focused hypothesis testing and attempts at replication. Finally, the scale we used to measure disengaged coping in the present study had low internal validity, suggesting that the items possibly did not measure a single concept. This might be a result of the short-version adaptation. It would therefore be recommended to validate the self-report with observational instruments (Compas et al., 2001).

Notwithstanding these limitations, the current study has a number of significant implications for future research and clinical practice. For future outcome research it is recommended to focus not just on efficacy of interventions, but to include baseline child and family factors that are amenable to intervention as potential moderators. Since the current study indeed showed moderating effects, an important task for future research will be to validate our findings, possibly within a larger sample. This would also allow investigating multiple moderators at the same time, to examine their relationships and relative importance in moderating outcome. In the end, results of studies on moderation leads to optimal psychosocial care by selecting interventions to the specific needs, which in turn can produce stronger intervention effects (Kraemer, Frank, & Kupfer, 2006). In addition, to further understand how adjustment in children with CI can be improved by interventions, it will be key to also investigate coping and parenting variables as mechanisms of behavioral change (Kraemer, Kiernan, Essex, & Kupfer, 2008; La Greca, Silverman, & Lochman, 2009).

For clinicians, findings from studies on moderation can provide information needed for customizing interventions to clinically-relevant characteristics of pediatric populations (Drotar, 1997). Although findings of our study should be considered tentative, tailoring interventions to individual children's coping style and self-worth might improve the benefit. When many disengaged coping behaviors (self-criticism, social withdrawal) are present, or children report low self-worth, the intervention including parents and children appears better suited than the intervention that only focused on the children. In addition, obtaining information regarding parent-child relationships can help clinicians to decide which families will benefit from a parent-child intervention and which may need additional resources. To strictly perform adequate pre-treatment screening with the use of questionnaires however, good questionnaires, with good norm data and clinical cut-off scores of measures are necessary.

## CONCLUSION

This study indicates that a cognitive behavioral group intervention on coping with pediatric chronic illness is most effective for children with a disengaged coping style and lower self-worth, which are both risk factors that are targeted in the intervention. In addition, for these 'at risk' children involving parents in the intervention seems even more vital. However, a secure parent-child relationship seems necessary to provide a secure base from which intervention goals can be effectuated by parent-child dyads. Future research should focus on good quality standardized measures that can be used as pre-treatment screening instruments, and on studying the described child- and parent factors as mediators of intervention effects. These and future efforts have the potential to accomplish the ultimate goal of delivering evidence-based, targeted care for children with chronic illness and their families.

