Moderators of the Efficacy of a Psychosocial Group Intervention for Children With Chronic Illness and Their Parents: What Works for Whom?

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Objective  To investigate psychosocial characteristics of children and parents as predictors and moderators of the effect of a 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 wait-list control group. Longitudinal multilevel regression analyses were used to test effects on change in parent and child reported internalizing and externalizing behavior problems.  Results  For children with a more disengaged coping style or 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 an intervention, especially if their parents are involved as well. However, the benefit of parents’ involvement may depend on the quality of the parent–child relationship.

Key words  chronic illness; coping; moderators; parent–child relationship; parenting stress; self-worth.

Introduction

Children with chronic illness (CI), such as asthma, diabetes, and arthritis, are at an elevated risk of behavior problems (Barlow & Ellard, 2006; Pinquart & Shen, 2011). During the past decades, studies have suggested that adjustment in children with CI may be promoted using cognitive behavioral therapeutic techniques (Barlow & Ellard, 2004; Beale, 2006; Thompson, Delaney, Flores, & Szigelthy, 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). Addressing parenting distress and enabling parents to be agents of change in the management of their children’s CI have recently been promoted as feasible treatment approaches (Jordan, Eccleston, & Osborn, 2007; Palermo, Wilson, Peters, Lewandowski, & Somhegyi, 2009). Little is known, however, about the efficacy of multicomponent 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 CIs showed small to moderate positive effects on active coping skills and behavior problems (Scholten et al., 2013). Adding a parallel program for parents focused on parenting skills, where parents learned to respond sensitively to child emotions and motivate their children to apply the learned skills in everyday life, enhanced the effects on some of the outcomes. To further investigate intervention effects and to identify which protocol (child-only vs. parent–child) works best for whom, it is essential to study pretreatment risk or resistance factors as moderators (Hinshaw, 2007; Simon & Perlis, 2010).

Studies of differential intervention effects in intervention studies have generally used two different approaches. Many previous studies have examined general predictors of outcomes, but few have examined true moderators (predictors of differential effects to alternative treatments). It is essential to distinguish more general predictors of treatment outcome from moderators of differential efficacy (Simon & Perlis, 2010). In this study, we investigate predictors as characteristics that may influence the change in outcomes, regardless of intervention type or study group. Moderators are investigated as characteristics that potentially influence the effectiveness of a treatment. Moderators identify subgroups with greater or lesser chances for positive response, in a particular intervention. In this study, predictors as well as moderators were investigated.

Transactional models of child adaptation to CI recognize the importance of numerous psychosocial risk and protective factors that could be targeted and modified in interventions (Kazak, 2006; Thompson & Gustafson, 1996; Wallander & Varni, 1998). Specifically, the stress and coping model of Wallander and Varni (1998) identifies several illness, child, and family factors (Wallander & Varni, 1998). Although illness-related factors, such as illness severity and illness type, show associations with psychosocial functioning in children with CI (Haverman et al., 2012; McQuaid, Kopel, & Nassau, 2001), these factors were not found to predict or moderate treatment response (Kibby et al., 1998; Scholten et al., 2013). Child and family factors such as coping style, self-perception, parenting stress levels, and parent–child relationships are therefore potentially more relevant, especially if they are amenable to intervention.

Psychosocial interventions for children with CI that include the stimulation of active and engaged coping skills and positive self-perceptions (Scholten et al., 2011) may have stronger direct and indirect effects for children who at the outset report passive, disengaged coping strategies, and negative self-perceptions. Therefore, more disengaged coping and less positive self-perception were expected to be predictive of stronger decreases in behavioral problems than more engaged coping and more positive self-perception, for both intervention conditions. Because the parallel parent program also promoted responsive parenting and supported parents to motivate their children to use engaged coping strategies, it was expected that children high on disengaged coping strategies and lower in positive self-perception would benefit more from a parent intervention as compared with a child-only intervention.

Interventions that involve parents may be helpful for those parents who are aware that they may currently lack sufficient understanding and skills to support their children in dealing with their CI. Parents who acknowledge stress in their parenting role may thus be more receptive to intervention than parents who do not perceive problems and stressors in the parenting role (Meppelder, Hodes, Kef, & Schuengel, 2014). Furthermore, complex parenting skills such as encouraging children to use adaptive coping strategies or fostering positive self-perception in the face of CI may be learned and applied more easily if the parent–child relationship is already built on an emotionally secure basis. Therefore, we expected that the combined parent–child intervention would be more effective than the child-only intervention for children and parents with higher reported parenting stress and emotional security of the relationship. In sum, greatest improvements in adjustment to CI were expected for children who had the most to learn from the group intervention (Hautmann et al., 2010), namely, those who had a disengaged coping style, lower self-worth, and higher baseline problems. Thus, disengaged coping style and lower self-worth were expected to predict stronger intervention effects, in both the parent–child and child-only intervention compared with the wait-list control group. Furthermore, with regard to moderator effects, the combined parent–child intervention may be more effective than the child-only intervention for children with a disengaged coping style and lower self-worth, and for children of more distressed parents and with secure parent–child 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 would be effective for both boys and girls of all ages.

Methods

Design

Participants came from a multicenter, randomized, controlled trial that was designed according to the Consolidated Standards of Reporting Trials statement (Schulz, Altman, & Moher, 2010; ISRCTN: 60919570). Full details of the protocol and the efficacy of the interventions were previously described (Scholten et al., 2011, 2013). The study protocol was reviewed and approved by the Medical Ethical Committee of the Academic Medical Center Amsterdam. Study participants were assigned randomly to a child-only intervention, a parent–child intervention, or a wait-list control group. Assessments were conducted at baseline (T0), 6 months later posttreatment (T1), and 12 months later at follow-up (T2).

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 an informed consent 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, and (d) had no severe learning difficulties. Families were not actively discouraged to seek additional psychological care. Figure 1 shows participant flow from recruitment to follow-up. Subject retention to study completion was 82% (see Scholten et al., 2013, for details of participant screening and randomization). A total of 194 children were computer allocated by an independent researcher across the three study groups. To reach treatment groups of equal size, blocking within centers was used (Schulz & Grimes, 2002), ratio 1:1:1, with varying block sizes of 12–24 children. However, in two of the nine centers, participants were randomized into child-only and wait-list group because of a shortage of psychologists carrying out the intervention, which led to sample size imbalance between the two intervention groups. We controlled for possible center effects in our data analyses. 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%), autoimmune diseases (n = 24; 12%), kidney disease (n = 24; 12%), inflammatory bowel disease (n = 19; 10%), and asthma (n = 18; 9%).

Interventions

The child intervention for children in the child-only as well as the parent–child study group consisted of six weekly 90-min sessions, with four to eight participants per group (M = 5.04, SD = 0.89). Two trained psychologists carried out the course of treatment using a detailed manual. Active coping skills were taught using cognitive behavioral-based techniques. Coping skills were taught via five learning goals: (1) information seeking and information giving about the disease, (2) use of relaxation during stressful situations, (3) increase knowledge of self-management and medical compliance, (4) enhancement of social competence, and (5) positive thinking (Last, Stam, Onland-van Nieuwenhuizen, & Grootenhuis, 2007; Scholten et al., 2011). During the group sessions, the training included psycho-education (such as informative videos and group discussions), practice through exercises (such as role-play and board games), and homework assignments. Two slightly different versions were developed for children in primary school (8–12 years) and adolescents in secondary school (12–18 years). The cognitive behavioral techniques used in the two versions were the same, but each protocol described age-appropriate examples and exercises/videos/role-plays.

The parent component was parallel to the child sessions, also led by two psychologists, and based on a detailed protocol of six weekly sessions. Parents were taught to sensitively attend to their child’s need and to encourage their child to use the learned coping strategies. All sessions took place in the hospital/school where the child was recruited. A detailed description of the content of the interventions is described in our previous publications (Last, Stam, Onland-van Nieuwenhuizen, & Grootenhuis, 2007; Scholten et al., 2011). Participants in the wait-list control group were invited to take part in the intervention after the final follow-up assessment at 12 months.

Treatment integrity was (1) rated by trained psychology students (n = 6) on videotaped randomly selected sessions and (2) reported by psychologists themselves. For the observations, each session was divided into different parts and each part was coded on two aspects. Scores were assigned based on whether the interventionist (a) used the course materials (scale: 0–1) and (b) used the key explanations from the protocol (scored on a scale from 1 to 5). All scores were summed and averaged across all parts of the...
Psychologists reported on whether they had followed the manual for each session (yes = 1/no = 0). Scores were averaged across all sessions. This resulted in two integrity scores for each intervention group, an observed integrity score (1–6) and a psychologist score (0–1).

**Measures**

Background and control variables were obtained from parents. Family composition and socioeconomic status (income) and family members’ age, gender, and ethnicity were recorded. The setting for the intervention was also recorded (academic hospital, nonacademic hospital, or school), as well as stressful life-events, and the use of psychological care besides the studied interventions. Parents rated illness severity using a proxy measure based on the occurrence of the following 13 possible consequences of CI in the past year (0 = no, 1 = yes, scale 0–13): doctor visits, hospitalization, surgery, use of medication, dietary consequences, visible malformations, use of appliances, diet

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**Figure 1. Participant flow through study.**

*Numbers of participants in the child-only and wait-list group were higher than in the parent–child group because participants were randomized more frequently into those two groups. This was due to a shortage of psychologists in two of the nine centers.** Longitudinal analyses included all available data from each subject up to withdrawal or study completion.
limitations, exercise, hearing, vision, speech, and course of the disease (0 = improving, 0 = stable, 1 = deteriorating, 1 = unstable).

**Outcome Measures**

Behavior problems were assessed with the Dutch versions of the Parent Report Form (PRF; 4–18 years) of the Child Behavior Checklist and the Youth Self-Report (YSR; 11–18 years) (Verhulst, van der Ende, & Koot, 1996, 1997). Questionnaires consisted of 120 (PRF) and 119 (YSR) problem items and a 3-point Likert scale (from 0 indicating not true to 2 indicating very true or often true, considering behavior during the past 6 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 not included in the analysis given the nature of the sample (Perrin, Stein, & Drotar, 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 normative population) demarcates the clinical range, which is indicated 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 α = .84–.91.

**Baseline Characteristics**

Severity of behavior problems was measured using 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 the 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 that 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 α = .62, five items) and comparable with other studies (Addison et al., 2009).

*Self-worth* was assessed with the global self-worth subscale of the Dutch version of the Perceived Competence Scale for Children (8–12 years) and the Perceived Competence Scale for Adolescents (12–18 years) (Harter, 1986; Treffers et al., 2002; Veerman, Straathof, Treffers, van den Bergh, & tenBrink, 1997). The child version consists of six items, and the adolescent version consists of five items (e.g., “Some children are happy with themselves” vs. “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” and “really true.” To combine scores from the children and adolescent versions of the Harter scales in the analyses, we used the raw scale scores divided by the number of items. A higher score indicates higher self-worth. Adequate reliability and content validity in samples of children with and without illnesses has been reported (Treffers et al., 2002; Veerman et al., 1997). Internal consistency in the current sample was satisfactory (for the child version Cronbach’s α = .78, and for the adolescent version α = .89).

*Emotional security of the parent–child relationship* with the parent involved in the study was measured using the Dutch version of the Child Security Scale (CSS; Kerns et al., 2001). Children rated 15 statements (e.g., “I feel my mother really understands me”) on a 4-point scale ranging from “totally agree” to “totally disagree.” The CSS consists of 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 adequate psychometric properties (Kerns et al., 2001). Internal consistency of the total score, used in the present study, was satisfactory (Cronbach’s α = .81).

*Parenting stress* was assessed using the short Dutch version of the “Parenting Stress Index” (De Brock, Vermulst, Gerris, & Abidin, 1992). Fourteen items referred to parental characteristics (e.g., efficacy, depression) within the care-giving context, and were rated by parents 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**

Multilevel analyses were performed on an intent-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. Multilevel models take account of possible bias in standard errors resulting from the nonindependence of observations and can effectively manage varying sample sizes and unequally spaced measurement occasions (Snijders & Bosker, 2012). Therefore, despite missing data (<5%), all children were maintained in the analyses. 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, emotional security, and parenting stress) were mean centered to facilitate post hoc interpretation of the interaction effect (Aiken & West, 1991).

A stepwise procedure was used to model individual growth curves following the recommendations of Singer and Willet (2003; see also Scholten et al., 2013), 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, intercept and time (assessment occasion) were added as random effects 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 nonsignificantly related to the intercept or change in the dependent variables. In Step 4, study group and the interaction between group and time were entered into the model to estimate treatment effects on intercept and change in dependent variables. The study-group variable had three categories (child-only, parent–child, wait-list control) and was entered as a categorical variable in the analyses. SPSS fits categorical variables as factors by creating dummy variables using the last category (wait-list control) as the comparison group (Heck, Thomas, & Tabata, 2010; Leyland, 2004).

To test differences between the child-only and the parent–child group, the analyses were repeated with a recoded study-group variable where the parent–child group was the reference category. Step 5 tested the predictor effects of the baseline characteristics via two-way interactions of each of the background characteristics with time and with study group. The final step (Step 6) tested the moderator effects via three-way interactions between baseline characteristic, study group, and time. Because significant three-way interactions do not indicate how baseline characteristics relate to change in outcomes after alternative treatments, post hoc tests were performed (Aiken & West, 1991; Holmbeck, 1997). First, a new variable was created representing the four subgroups that can be distinguished: Children scoring high or low on the baseline characteristic (±1 SD) participating in the parent–child or child-only intervention group (or wait-list control depending on the significant group differences). Second, we added this new subgroup variable to the Step 3 model, together with the interaction between this variable and time. These analyses were repeated twice with recoded subgroup variables with different reference categories, so that all comparisons were tested. Significant subgroup differences on change (Subgroup ×Time) were reported in the results section together with estimates. Third, to facilitate interpretation mean problem levels for the four different subgroups were plotted in separate figures.

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 were the multivariate statistics of the predictors and moderators interpreted. An $\alpha$ of .05 was used to test the statistical significance of the effects. Because this study was designed to examine the effects on change in outcomes (treatment effects), we only reported the effects of predictors and moderators on change (slopes). Explained variances, including the predictor effects and moderator effects, 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, 2012). A priori power calculations indicated that a minimal sample size of 144 was needed to test the hypotheses based on a small to medium effect size ($f^2 = .10$) with an $\alpha$ of .05 to reach a power of .80.

**Results**

**Preliminary Analysis**

Table 1 shows descriptives of the demographic and main outcomes and characteristics at baseline. Despite
randomization, there were significant differences between study groups in age, illness severity, parenting stress, setting (academic hospital vs. nonacademic hospital), and seeking additional psychological care during treatment. To prevent confounding effects, we controlled for the variables that were also significantly associated with one of the outcomes. 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 child-reported internalizing

### Table I. Descriptives of Demographic and Main Variables at Baseline Together With Group Differences

<table>
<thead>
<tr>
<th></th>
<th>Child intervention (n = 71)</th>
<th>Parent–child intervention (n = 49)</th>
<th>Wait-list control (n = 74)</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>11.52 (2.42)</td>
<td>12.97 (2.95)b,c</td>
<td>11.90 (2.62)</td>
<td>.012</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td>.651</td>
</tr>
<tr>
<td>Male</td>
<td>53.5%</td>
<td>51.0%</td>
<td>45.9%</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>46.5%</td>
<td>49.0%</td>
<td>54.1%</td>
<td></td>
</tr>
<tr>
<td>Income (modal = €30,500 per year)</td>
<td></td>
<td></td>
<td></td>
<td>.647</td>
</tr>
<tr>
<td>≤Modal</td>
<td>42.4%</td>
<td>36.4%</td>
<td>43.5%</td>
<td></td>
</tr>
<tr>
<td>&gt;Modal</td>
<td>57.6%</td>
<td>63.6%</td>
<td>54.7%</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td>.037</td>
</tr>
<tr>
<td>Dutch</td>
<td>74.6%</td>
<td>89.4%</td>
<td>68.8%</td>
<td></td>
</tr>
<tr>
<td>Non-Dutch</td>
<td>25.4%</td>
<td>10.6%</td>
<td>31.3%</td>
<td></td>
</tr>
<tr>
<td><strong>Diagnosis (n = 45)</strong></td>
<td></td>
<td></td>
<td></td>
<td>.121</td>
</tr>
<tr>
<td>Type 1 diabetes</td>
<td>35.8%</td>
<td>20.4%</td>
<td>32.9%</td>
<td></td>
</tr>
<tr>
<td>Autoimmune disease</td>
<td>11.9%</td>
<td>16.3%</td>
<td>11.4%</td>
<td></td>
</tr>
<tr>
<td>Kidney disease</td>
<td>16.4%</td>
<td>10.2%</td>
<td>11.4%</td>
<td></td>
</tr>
<tr>
<td>Inflammatory bowel</td>
<td>9.0%</td>
<td>10.2%</td>
<td>11.4%</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>7.5%</td>
<td>14.3%</td>
<td>8.6%</td>
<td></td>
</tr>
<tr>
<td>Congenital disease</td>
<td>4.5%</td>
<td>20.4%</td>
<td>4.3%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>14.9%</td>
<td>8.2%</td>
<td>20.0%</td>
<td></td>
</tr>
<tr>
<td>Illness duration (years)</td>
<td>6.80 (4.39)</td>
<td>8.29 (4.95)</td>
<td>7.04 (4.06)</td>
<td>.175</td>
</tr>
<tr>
<td>Illness severity</td>
<td>4.95 (1.91)</td>
<td>5.31 (1.82)b</td>
<td>4.46 (1.52)</td>
<td>.032</td>
</tr>
<tr>
<td><strong>Setting</strong></td>
<td></td>
<td></td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>Academic hospital</td>
<td>31.0%</td>
<td>57.1%</td>
<td>47.3%</td>
<td></td>
</tr>
<tr>
<td>Nonacademic hospital</td>
<td>46.5%</td>
<td>42.9%</td>
<td>39.2%</td>
<td></td>
</tr>
<tr>
<td>School</td>
<td>22.5%</td>
<td>0.0%</td>
<td>13.5%</td>
<td></td>
</tr>
<tr>
<td><strong>Additional psychological care</strong></td>
<td></td>
<td></td>
<td></td>
<td>.341</td>
</tr>
<tr>
<td>During intervention (T0–T1)</td>
<td>24%</td>
<td>29%b,d</td>
<td>74%</td>
<td></td>
</tr>
<tr>
<td>During follow-up (T1–T2)</td>
<td>29%</td>
<td>28%</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRF internalizinge</td>
<td>9.03 (6.00)</td>
<td>10.00 (7.01)b</td>
<td>7.31 (4.76)</td>
<td>.035</td>
</tr>
<tr>
<td>PRF externalizing</td>
<td>9.37 (7.43)</td>
<td>9.35 (8.41)</td>
<td>6.85 (5.73)</td>
<td>.069</td>
</tr>
<tr>
<td>YSR internalizinge</td>
<td>9.78 (7.51)</td>
<td>10.09 (7.41)</td>
<td>9.87 (8.68)</td>
<td>.954</td>
</tr>
<tr>
<td>YSR externalizing</td>
<td>8.78 (6.89)</td>
<td>9.74 (5.89)</td>
<td>7.41 (4.83)</td>
<td>.535</td>
</tr>
<tr>
<td><strong>Baseline characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disengaged coping</td>
<td>10.14 (3.33)</td>
<td>10.49 (3.44)</td>
<td>9.96 (3.33)</td>
<td>.706</td>
</tr>
<tr>
<td>Self-worth</td>
<td>3.10 (0.72)</td>
<td>3.13 (0.78)</td>
<td>3.16 (0.70)</td>
<td>.885</td>
</tr>
<tr>
<td>Parent–child relation</td>
<td>60.81 (7.92)</td>
<td>60.61 (6.94)</td>
<td>60.75 (7.15)</td>
<td>.990</td>
</tr>
<tr>
<td>Parenting stress</td>
<td>18.44 (7.05)</td>
<td>22.04 (10.02)b,e</td>
<td>16.97 (6.05)</td>
<td>.003</td>
</tr>
</tbody>
</table>


* Differences across the three study groups tested using analysis of variance for continuous variables and χ² for categorical variables.

b Significant difference between parent–child intervention and wait-list control.

c Significant difference between parent–child intervention and child-only intervention.

d Significant difference between child-only and wait-list control.

e Excluding the “somatic complaints” scale.
problems, we controlled for those variables in the multilevel analyses. There was also a significant study-group difference in parent-reported internalizing scores. By including the intercept and study-group variable in Step 4 of the analyses, differences between study groups in internalizing problems at baseline were controlled (Singer & Willet, 2003).

Excluding somatic complaints from the internalizing scale, 43% of parents and 10% of children reported internalizing problems within the subclinical or clinical range ($T \geq 63$). Percentages of externalizing problems within subclinical or clinical range were 27% based on parental report, and 9% based on child report. These levels of problems are comparable with behavior problems reported for children with CIs in other studies (Pinquart & Shen, 2011). The average treatment integrity was not different for child intervention (observed: $M = 5.44$, $SD = 0.50$, range 4.04–6.00; psychologist: $M = 0.89$, $SD = 0.14$, range 0.57–1.00) and parent–child intervention (observed: $M = 5.47$, $SD = 0.59$, range 4.27–6.00; psychologist: $M = 0.83$, $SD = 0.17$, range 0.50–1.00).

**Primary Analyses**

Main efficacy results (Step 4) are shown in Table II (see Scholten et al., 2013, for further details). The addition of baseline characteristics as predictor and moderator effects (Steps 5 and 6) significantly improved the model fit ($p < .0001$) for all the four outcomes, gender, age, baseline behavior problems, and parenting stress, but did not significantly predict or moderate the effect of study group on any of the outcome variables ($p > .05$), and therefore these results will not be further described. The significant predictor and moderator effects are described in the next paragraphs.

**Predictor Effects**

The two-way interactions between baseline characteristics and time were interpreted from the Step 5 models (Table II). Regardless of study group, high self-worth was associated with a greater decrease in child-reported externalizing problems over time ($B = -.78$, $SE = .26$, $p < .003$). No significant predictor effects were found for disengaged coping and emotional security of the parent–child relationship ($p > .05$).

**Moderator Effects**

The three-way interaction effects between baseline characteristics, time, and study group showed that disengaged coping, self-worth, and emotional security significantly moderated change in behavior problems over time, differently across study group (Step 6 in Table II). Although all study-group comparisons were tested, there were no significant moderator effects for the parent–child versus the wait-list group.

**Coping.** Disengaged coping moderated the effect of study group on the linear change as well as the curvilinear change for parent-reported internalizing problems (Table II). Post hoc tests revealed significant differences between the child-only and the wait-list group on linear change, and between child-only and parent–child on curvilinear change. Children high on disengaged coping in the child-only intervention decreased significantly more in first half year compared with the wait-list group ($B = 22.90$, $SE = 8.33$, $p < .008$), but increased again in the second half year ($B = -5.71$, $SE = 2.07$, $p = .008$), while children high on disengagement in the parent–child intervention showed a continued decrease (Figure 2a and b). The moderation effects explained 6.2% of the variance. The final model with disengaged coping as a moderator explained 17.7% of the variance in parent-reported internalizing problems.

Significant moderation effects of baseline disengaged coping were also found on the linear change of child-reported externalizing problems over time. Post hoc tests revealed that children high on disengaged coping in the parent–child intervention decreased more rapidly on child-reported externalizing problems compared with children high on disengagement in the child-only intervention ($B = -4.08$, $SE = 1.10$, $p < .001$; Figure 2c). The moderation effects explained 11.4% of the variance. The final model with disengaged coping explained 13.1% of the variance in child-reported externalizing problems.

**Self-Worth.** Significant moderation effects were found for baseline self-worth on change in child-reported externalizing problems. As shown in Figure 2d, children low on self-worth in the parent–child intervention decreased more rapidly on child-reported externalizing problems compared with children with low self-worth in the child-only intervention. The moderation effects explained 12.4% of the variance. The final model with self-worth as moderator explained 14% of the variance.

**Security of the Parent–Child Relationship.** Significant moderation effects were found for baseline security of the parent–child relationship on change in parent-reported externalizing problems. Children with high emotional security showed a greater decrease on parent-reported externalizing problems in the parent–child intervention than in the child-only intervention ($B = -2.63$, $SE = 1.35$, $p = .058$). Furthermore, children with low emotional security showed a greater decrease in the child-only intervention than in the parent–child intervention (Figure 2e). Finally, in the child-only intervention, children with
low emotional security showed a more rapid decrease on parent-reported externalizing problems than children with high emotional security ($B = 3.87$, $SE = 1.27$, $p = .003$). The moderation effects explained 5.3% of the variance. The final model with emotional security of the parent–child relationship explained 7.3% of the variance in parent-reported externalizing problems.

Also, a significant moderation effect was found for child-reported internalizing problems. Post hoc tests revealed that children with high emotional security showed a more rapid decrease on child-reported internalizing problems in the parent–child intervention than in the child-only intervention ($B = -5.83$, $SE = 1.90$, $p = .004$). Furthermore, in the child-only intervention, children with low emotional security showed a greater decrease on child-reported internalizing problems than children with high emotional security ($B = 4.50$, $SE = 1.76$, $p = .014$; Figure 2f). The moderation effects explained 4.6% of the variance. The final model with emotional security of the parent–child relationship explained 17% of the variance in child-reported internalizing problems.

**Discussion**

The present study provides preliminary evidence of differential treatment effects of a behavioral group intervention for children with CI and their parents. A child-only intervention and a parent–child intervention were compared as alternative treatments on four different outcomes and against a wait-list control group. Findings revealed that baseline characteristics were associated with differential treatment effects. That is, 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 across 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 from a parent–child intervention than a child-only intervention. This finding is consistent with our hypothesis that these children would benefit more from an intervention aimed to improve the use of engaged coping styles and positive self-worth if parents were also involved. During treatment, children who used a more disengaged coping style were exposed to coping strategies that were incongruent with their predominant coping style; these children may need more support to apply these strategies in daily situations (Blount, Davis, Powers, & Roberts, 1991). Without parental support, children may continue to use their avoidant and disengaged coping strategy that 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). Similar arguments may apply for children with low self-worth, who benefit more from positive reinforcement from parents. Parental encouragement and reminding regarding these new skills in everyday life might explain why parent–child intervention effects are larger and endure more over 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 with their parent, 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 would be more effective for parent–child dyads with secure emotional relationships because parents in such relationships would likely be more able to communicate with their children and encourage...
them to apply the learned skills in everyday life (Willemen, Schuengel, & Koot, 2009). We also found that children who perceived a less secure relationship with their parent showed a larger decrease in the child-only intervention. These effects imply that children with a less secure relationship profited more when their parents were not involved in the intervention. However, the question remains whether a child-only intervention is most beneficial for these children. Perhaps, children with less secure parent–child relationships may benefit from additional treatment in which the parent and the child work together on communication and their interaction.

Baseline characteristics were not found to predict change in outcomes as main effects, except that high self-worth was associated with greater decreases in child-reported externalizing problems. This was contrary to our expectation that children with low competences on the learned skills would benefit more from the intervention in general than their low-risk peers. Because the intervention appeared effective in reinforcing the use of engaged coping skills (Scholten et al., 2013), rather than the extinction of disengaged coping skills, children with low and high disengagement may benefit equally from the intervention. Another explanation might be that, although high-risk children may benefit more from the intervention compared with low-risk peers, with regard to coping skills, the effect of the intervention on their adjustment might be comparable.

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 before the intervention. This may be because parenting stress was the only parent-reported baseline variable. However, 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.

Limitations
Results should be interpreted in light of several limitations. First, although we used multilevel modeling, some of the models 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 research area, these findings might lead to more focused hypothesis testing and attempts at replication. Third, although we statistically controlled for baseline differences, it is still possible that these differences influenced the effects. Also, possible floor effects might explain the lower decline in children scoring low on the baseline characteristics. Fourth, the outcomes used in this study are based on reports of individuals who were the targets of the interventions, and who therefore may have had expectations regarding effects. Future studies may also include other informants not involved in the intervention, such as teachers or pediatricians. Finally, because those in the parent–child group spent more time in the intervention than those in the child-only group, it is not possible to rule out time of treatment exposure as an alternative explanation for differences across outcomes between the two interventions.

Implications for Future Research
The current study has a number of significant implications for future research. For example, it is recommended that future work focus not just on the efficacy of interventions but also to include baseline child and family factors that are amenable to intervention as potential moderators. Because the current study showed moderating effects, an important task for future research will be to validate our findings, possibly with a larger sample. This would also permit the investigation of multiple moderators at the same time and to examine their relationships and relative importance in moderating intervention outcomes. In the end, results of studies on moderation can lead to optimal psychosocial care by matching interventions to the specific needs of individual children, 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 with interventions, it will be important to also investigate coping and parenting variables as mechanisms, or mediators, of behavioral change (Kraemer, Kiernan, Essex, & Kupfer, 2008; La Greca, Silverman, & Lochman, 2009).

Implications for Clinical Practice
For clinicians, findings from studies on moderation can provide information needed for customizing interventions to clinically relevant characteristics of pediatric populations (Drotar, 1997). Although the 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 that includes both parents and children appears to be more effective than the intervention that only focused on the children. Based on the advantages of the parent–child program over the child-only program in a significant number of cases and the lack of disadvantages, it is defensible to offer this version by default. However, with improved screening and quantitative cost–benefit analyses, a more tailored approach might be developed in the future. 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.

Conclusion

This study indicates that a cognitive behavioral group intervention focused on coping with a pediatric CI is most effective for children with a disengaged coping style and lower self-worth and when parents are also involved in the program. However, a secure parent–child relationship seems necessary to provide a secure base from which intervention goals can be realized. Future research should include standardized measures that have adequate psychometric quality and that can be used as pretreatment screening instruments. Also, we need to examine child and parent factors as potential 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 CIs and their families.

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