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Mediators for Internalizing Problems in Adolescents of Parents with Chronic Medical Condition

D. S. Sieh · F. J. Oort · J. M. A. Visser-Meily ·
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Abstract Parents' chronic medical condition (CMC) is related to internalizing problem behavior in adolescents. Following the transactional stress and coping (TSC) model of Hocking and Lochman, our study examines whether the effect of illness and demographic parameters on the child's internalizing problems is mediated by the ill parent's quality of life, family functioning, and child adaptational processes. Participants were 160 adolescents (52 % female, mean age=15.1 years) from 100 families affected by parental CMC. Children completed a test battery including the Youth Self-Report. Family functioning was determined with the Interactional Problem Solving Inventory (marital functioning) and the Inventory of Parent and Peer Attachment (alienation from parents). Child adaptational processes were composed by cognitive processes, methods of coping, and child report of stress. Ill parents completed the Medical Outcome Study Short-Form and the Beck Depression Inventory, assessing quality of life. We used structural equation modeling to investigate the tenability of the TSC model. After a series of step-by-step modifications, the TSC model for children with parental CMC fitted the data closely. The ill parent's quality of life, family functioning, and children's daily hassles and stress mediated the effect of parental CMC on adolescent internalizing problems. Children's active problem solving and social support seeking were not directly related to internalizing problems but significantly interfered with children's self-esteem and stress. Child adaptational processes should be accorded a central role in support programs and interventions for children with parental CMC. Health practitioners and teachers are recommended to be alert for support needs in children.

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Introduction

Parents' chronic medical condition (CMC) affects the whole family (Visser-Meily and Meijer 2006). Children appear to be vulnerable to developing problem behavior after the diagnosis of their parent's CMC. A meta-analysis found that these children are significantly more likely to show internalizing problems than other children. However, most children cope well with parental CMC, fostering the idea that protective mechanisms buffer adverse consequences for children (Sieh et al. 2010a). Overall, families maintain a regular state of balance and undergo periods of stability and change (Hoffmann 2006; Hoffmann and Johnson 1998). Parental CMC can be viewed as life-event or stressor affecting physical and psychological well-being in family members, which demands action to restore balance by way of individual and collective adaptational processes (Lazarus and Cohen 1977; Lubkin and Larsen 2006). Presumably, family members are interrelated in ways that parental CMC is associated with cognitive, behavioral, and emotional reactions in the ill parent and in other family members (Thompson and Gustafson 1996). Parental CMC alters the family homeostasis and may even form a chronic stressor leading to the depletion of resources (Forehand et al. 1998).

The Transactional Stress and Coping (TSC) Model

Research shows that a direct relationship between illness severity and child adjustment to parental CMC is lacking (Visser-Meily et al. 2005a, b). Instead, the relationship between CMC and adolescent problem behavior is mediated by adaptational processes within the family (Thompson and Gustafson 1996). One of the most widely used models for explaining child adjustment to chronic illness is the transactional stress and coping model (TSC) model. This model originates from the ecological systems model (Bronfenbrenner 1977), suggesting that child adjustment is mediated by individual actions of family members (microsystem), interactions between family members (mesosystem), and external environments (exosystem). Inspired by the work of Lazarus and Folkman (1984), the TSC model integrates three kinds of adaptational processes, that is, family functioning and children's cognitive processes and methods of coping, suggesting that these processes are interrelated. According to Lazarus and Folkman (1984), perceiving stress depends on the interpretation of life-events and daily hassles as threatening or stressful (primary appraisal) and on the evaluation of personal coping mechanisms and resources to cope with the stressor (secondary appraisal).

An extensive review has adapted the TSC model for children with sickle cell disease and insulin-dependent disorder (Hocking and Lochman 2005). The TSC model of Hocking and Lochman, see Fig. 1, includes illness parameters (i.e., type, severity) and demographic parameters (i.e., children's gender and age, and socioeconomic status) and emphasizes family functioning and child adaptational processes (children's cognitive processes and methods of coping) in response to chronic illness. Hocking and Lochman (2005) classified family functioning as supportive, conflicted,

Fig. 1 Transactional stress and coping (TSC) model of Hocking and Lochman (2005)

or controlling. Studies included in their review measured family functioning by way of anger expression or conflict, supportiveness, and cohesion. Cognitive processes refer to stress appraisal, illness tasks (e.g., perceived care and caregiving, dealing with medication, and expectations of treatment efficacy), self-esteem, and health locus of control (Thompson et al. 1993). Stress appraisal is an important variable that implies the interpretation of illness-related characteristics on a continuum from harmless to threatening. Further, children possess various methods of coping with chronic illness. For instance, they may seek social support and take a problem-focused approach to illness demands. Similarly, it is essential to consider whether social resources and support are available (Pakenham and Bursnall 2006; Pederson and Revenson 2005).

The TSC model may also be applied to children with parental CMC because of its emphasis on family functioning and child adaptational processes. Accordingly, a review of six articles examining family variables revealed that child adjustment to parental CMC is strongly related to family functioning and children's coping strategies (Korneluk and Lee 1998). Recent studies also documented the importance of family functioning in this respect (Sieh et al. 2010a). For example, a longitudinal study on 44 children whose parents had suffered a stroke revealed that long-term stress in children is linked to parental depression (Sieh et al. 2010b). Similarly, children's problem behavior seems to be associated with the quality of marital relationship (Visser-Meily et al. 2005b). Despite the evidence for the significant role of child and family mediational processes, it remains unclear which processes act as key mediators for adolescent internalizing problems. Besides, it has yet to be verified

whether the TSC model is applicable to the relationship between illness and demographic parameters, and children's internalizing problems.

The mediating role of adaptational processes may explain how parental illness can have an adverse impact on some but not all offspring. Evidence suggests that children with parental CMC only have slightly increased scores on problem behavior in comparison with other children. However, there seems to be a significantly higher chance to display clinical levels of internalizing problems, especially for girls (Korneluk and Lee 1998; Sieh et al. 2012b). Child report of stress has a strong relationship with internalizing problem behavior in children. In a study on parental cancer, one fifth of the sons and more than one third of the girls displayed clinical levels of stress and reported clinically elevated levels of internalizing problems (Huizinga et al. 2005). The extent to which children appraise parental illness as stressful is connected to adverse child outcomes, whereas the mere severity of illness does not appear to play a major role (Korneluk and Lee 1998).

Based on the theoretical underpinnings of the TSC model and empirical evidence, we transformed the TSC model of Hocking and Lochman (2005) into Model 1 (Fig. 2). Model 1 mimics the TSC model of Hocking and Lochman, but also has its unique features. With regard to illness and demographic parameters, child adjustment to parental CMC should include both child and parent demographics apart from illness parameters. In this line, a review of 19 studies examining illness and demographic parameters in more than 18,000 children with parental CMC concluded that studies characterized by longer illness duration and younger age of children and parents displayed larger effects for internalizing problems in children (Sieh et al. 2010a). Hocking and Lochman qualify family functioning as a matter of support, conflict, and control. Even so, family functioning can be operationalized with marital functioning (Lange 1983; Lange et al. 1990) and quality of parent attachment (Armsden and Greenberg 1987). The TSC model of Hocking and Lochman takes children's behavioral competence and health locus of control into account. Notwithstanding, it seems to us that behavioral competence has overlap with child adaptational processes. Conversely, we include child report of stress and a variety of measures of the ill parent's quality of life, which show stronger associations with child adjustment in the field (Sieh et al. 2010a, b).

Fig. 2 Transactional stress and coping model for children with parental chronic medical condition (model 1)

Aim

The aim of this paper is to test the tenability of the TSC model as applied to children with parental CMC by examining the mediating effects of the ill parent's quality of life, family functioning, and child adaptational processes on adolescent internalizing problems. Taking a family-centered approach to parental CMC, we use data from families including ill parents, spouses, and children (Visser-Meily et al. 2006). By gathering information from all family members, we avoid statistical disadvantages of the common-method variance (Grills and Ollendick 2003). This study is the first in the field with a multilevel structural design that countenances the family cluster effect while examining mediating effects between illness and demographic parameters and internalizing problems in adolescents with parental CMC (Heck 2001). Insight into this relationship can be useful for interventions aimed at prevention of future problems and improvement of the developmental prospect for adolescents dealing with parental illness.

Our assumption is that long illness duration, higher unpredictability of illness, and lower socio-economic status are linked to lower family functioning (Sieh et al. 2010a). We also hypothesize that family functioning and child adaptational processes mediate the relationship between illness and demographic parameters and child adjustment. We expect that high family functioning, low levels of children's daily hassles, high self-esteem, adequate coping skills, and low levels of stress are associated with lower internalizing problem scores in adolescents. Finally, we hypothesize that high quality of life of the ill parent is associated with lower problem scores in children.

Method

Sample Characteristics

Adolescents, ill parents, and spouses were recruited in rehabilitation centers, schools, hospitals, and community centers across the Netherlands between September 2008 and April 2010. In addition, 30 randomly selected general health practitioners in all Dutch provinces were asked to cooperate and post brochures in the waiting room of their office. National health organizations for patients clustered into diagnostic groups (e.g., stroke) were contacted to recruit potential participants through websites, newsletters, and quarterly journals. Participants could contact the project manager to ask for additional information. After informed consent had been given, research assistants made an appointment to administer a test battery at the family home. Adolescent participants received a cinema voucher worth 10 Euro. After participation, families were informed about the results of the study. The study was approved by the ethical commission of the Research Institute of Child Development and Education of the University of Amsterdam.

Participants

From 116 families contacting us, 102 families finally participated. Eight families chose to refrain from participation without indicating a reason. One family perceived participation as a burden. The remaining families could not participate because their

children were too old, too young, or disabled, or because the parent was not impaired by the illness. Data from one family were excluded from analyses because the child was unwilling to fill in the questionnaires. One of the ill parents was too impaired to complete the questionnaires. In two families, both parents were diagnosed with a CMC, so the parent with the most impairing illness was chosen for the data analysis. Finally, data from 160 adolescents between 10 and 20 years of age living at home, ill parents ($N=102$), and healthy spouses ($N=83$) were available for statistical analyses.

Fifteen percent of the families were single parent families. Ill parents were diagnosed with an impairing medical condition lasting for more than 6 months. Parental CMC's included multiple sclerosis (28.4 %), rheumatoid arthritis (19.6 %), brain damage (16.7 %), neuromuscular disease (14.7 %), spinal cord injury (6.9 %), inflammatory bowel disease (5.9 %), Parkinson disease (4.9 %), and diabetes type I (2.9 %). Illness duration was 12.7 years on average, see Table 1. The adolescents were equally distributed by gender. Two thirds of ill parents were female, which could be ascribed to the fact that our illness sample mainly included autoimmune diseases that occur more often in women (78 % of the cases) than in men (Fairweather and Rose 2004). Most families were native Dutch; three families originated in other European countries.

Measures

Illness Parameters

Illness duration was calculated as time difference between the date of investigation and the date of diagnosis. As an indication of illness severity, each participant of the family evaluated the unpredictability of parental illness by answering 5 items on a 5-point scale stretching from 0 (*strongly disagree*) to 4 (*strongly agree*). This scale was

Table 1 Demographics of children, parents, and families

Children ($n=160$)	
Female	51.9 %
Age in years (<i>SD</i>)	15.09 (2.34)
Mean raw score of internalizing problems (<i>SD</i>)	9.59 (8.62)
Mean T-score of internalizing problems (<i>SD</i>)	49.51 (12.27)
Ill parents ($n=102$)	
Female	67.6 %
Mean age in years (<i>SD</i>)	47.11 (5.50)
Illness duration in years (<i>SD</i>)	12.67 (11.05)
Healthy spouses ($n=83$)	
Female	32.4 %
Mean age in years (<i>SD</i>)	47.46 (5.66)
Currently employed	84.3 %
Families ($n=100$)	
Mean family income per month after taxes in Euro (<i>SD</i>)	2685 (949)
Mean time of marital relationship (<i>SD</i>)	21.14 (4.68)

originally developed by Pakenham et al. (2006) and (back)translated by a native speaker to create the Dutch version for ill parents, spouses, and children. An exemplary item for ill parents was “*My condition could change at any time with little warning*”. All items were summed and divided by the number of respondents per family, with higher scores indicating greater unpredictability of parental illness. Cronbach’s alpha for 15 items was $\alpha=.89$.

Demographic Parameters

Children’s and ill parents’ gender (male=0, female=1) and exact age (with two decimals) were included. Socio-economic status (SES) was evaluated by way of the monthly family income after tax deductions. We used an 8-point scale ranging from 1 (*less than 1,000 Euro*) to 8 (*more than 4,000 Euro*).

Family Functioning

Family functioning consisted of marital functioning and quality of parent attachment. Both parents answered 17 questions about the quality of marital relationship from the Interactional Problem Solving Inventory (IPSI). The IPSI was scored on a 5-point Likert scale with a total score between 17 and 85. Higher scores are an indication of a well-functioning marriage (Lange 1983; Lange et al. 1990). Total scores were calculated as the mean of ill and healthy parents’ scores. The reliability of the summed scale was $\alpha=.87$. The child’s perception of the quality of parent attachment was determined with two 4-item subscales from the Inventory of Parent and Peer Attachment (IPPA) whose psychometric properties were evaluated positively by Armsden and Greenberg (1987). The scales showed satisfactory to good reliability in this study: *child’s alienation from mother* ($\alpha=.65$) and *child’s alienation from father* ($\alpha=.77$).

Child Adaptational Processes

Cognitive processes, methods of coping, and child report of stress fall under the category of child adaptational processes.

Cognitive Processes Cognitive processes are represented by the child’s perception of daily hassles, illness tasks, and self-esteem. To incorporate perceived daily hassles, we administered the subscale *frequency of daily hassles affecting personal life* of the Dutch Daily Hassles Questionnaire comprising 8 items (e.g., *How often do you think that it is difficult to maintain contact with your friends because of the situation at home?*). Items were answered on a 5-point scale (i.e., *not at all*, *less than once a week*, *1–3 times a week*, *3–6 times a week*, and *daily*), with higher scores indicating more caregiving activities. The subscale showed good reliability in our study ($\alpha=.80$) and proved to be valid (Dufour et al. 2006). Illness tasks were measured with the Dutch Caregiving Inventory (DCI), determining the frequency of perceived caregiving duties such as dealing with medication and helping the ill parent with personal hygiene (e.g., *How often do you have to help brush the teeth of your ill parent?*). The 8 items measuring illness tasks were answered on a 5-point scale with higher scores

indicating more caregiving tasks as reported by adolescents (i.e., *not at all*, *less than once a week*, *1–3 times a week*, *3–6 times a week*, and *daily*). The DCI has proven to be a valid instrument in prior research (Meijer et al. 2008) and had good reliability ($\alpha=.75$) in this study. Self-esteem was determined with the School Perception Questionnaire (8 items, $\alpha=.89$) and was related to school performance. An exemplary item was “*I think that I perform well at school*” (Van der Wolf 1995). Higher scores represent higher school-related self-esteem.

Methods of Coping Children’s methods of coping were assessed with the adolescent version of the Utrecht Coping Questionnaire (UCL-A). We used the subscales *active problem solving* (6 items, $\alpha=.80$) and *social support seeking* (6 items, $\alpha=.88$) from Schreurs et al. (1993) who attested good reliability and validity indices of the UCL-A. In addition, adolescents answered 6 questions ($\alpha=.75$) with response categories stretching from *never* (1) to *daily* (6), composing the scale *frequency of social support*. This scale measured how often children actually received support from family members and people in their environment (e.g., *How often do you receive help from your friends?*).

Child Report of Stress Child report of stress was assessed with the Dutch Stress Questionnaire for Children including 17 items. Scores range from 17 to 68; a higher score indicates more stress in the previous 3 months. Internal consistency and validity of the measure was tested in children of parents with Parkinson’s disease (Cronbach’s $\alpha=.83$; Dufour et al. 2006). In this study, Cronbach’s alpha was .86.

The Ill Parent’s Quality of Life

Ill parents filled in the Medical Outcome Study Short-Form 36 (SF-36) including 6 health-related scales: *physical functioning* (10 items, $\alpha=.93$), *social functioning* (2 items, $\alpha=.80$), *role limitations due to physical health problems* (4 items, $\alpha=.79$), and *role limitations due to emotional problems* (3 items, $\alpha=.85$). We also administered the subscale *bodily pain* (2 items, $\alpha=.86$) and the scale *general health perception* (5 items, $\alpha=.72$). All scales range from 0 (*worst*) to 100 (*best*). The SF-36 is a widely used measure whose validity is proven (Brilstra et al. 2004). Depressive symptoms (in brief: parental depression) were measured with the Beck Depression Inventory (BDI), a 21-item self-report scale including affective, cognitive, behavioral, and somatic signs of depression (Beck et al. 1961). Higher scores indicate more depressive symptoms. The reliability of this measure was $\alpha=.85$.

Child Adjustment

For child adjustment, we assessed internalizing problem behavior with the Youth Self-Report (YSR; Achenbach 1991), a standardized self-report measure asking adolescents to rate statements about anxious, depressed, and withdrawn behavior, and somatic complaints on a 3-point scale as *not true* (0), *somewhat/sometimes true* (1) or *very/often true* (2). Cronbach’s alpha showed excellent reliability for the internalizing problem scale (31 items, $\alpha=.91$).

Data Analysis

We used structural equation modeling (SEM; Bollen 1989) to investigate whether the TSC model can be applied to children with parental CMC. To account for the dependency between respondents from the same families, we used the robust maximum likelihood estimation method that is implemented in the computer program Mplus (Muthén 1994). This method yields maximum likelihood estimates of regression coefficients, residual variances and covariances, a scaled Chi-square measure (CHISQ) of exact fit, and a root mean square error of approximation (RMSEA) indicating approximate fit. With a significant Chi-square value ($p < .05$), the hypothesis of exact fit must be rejected, but RMSEA values below .05 and .08 still indicate close and satisfactory fit, respectively (Browne and Cudeck 1992). We took several steps to obtain a suitable model. The first step was to adapt the TSC model to children with parental CMC, while retaining as much as possible from the model of Hocking and Lochman (2005). Accordingly, we established a model with relationships among illness and demographic parameters, family functioning, child adaptational processes, the ill parent's quality of life, and adolescent internalizing problems. The first step resulted in a revision of the TSC model (Model 1), depicted in Fig. 2. The second step was to check whether the model fit could be improved by changing the role of the sets of quality of life and family functioning variables, resulting in Model 2. Subsequently, on condition of substantive justifiability, Mplus modification indices were used to introduce additional effects, yielding Model 3. Finally, for the purpose of clarity of presentation, we simplified the model by removing effects that were not significant at the 20 % level, which yielded the final model, Model 4.

Results

Model 1, given by Fig. 2, did not fit the data: CHISQ=302.16 ($df=108$, $p < .001$) and RMSEA=.106 (90 % CI=[.09, .12]). Inspection of modification indices and standardized residuals revealed that the observed covariances between illness parameters and family functioning, and between family functioning and the ill parent's quality of life were not sufficiently explained by Model 1. The ill parent's quality of life seems to be directly influenced by illness parameters. To generate Model 2, we exchanged the role of the ill parent's quality of life and family functioning. We added direct effects of illness parameters on the ill parent's quality of life, and of the ill parent's quality of life on family functioning. Additionally, we introduced direct effects of family functioning variables on child adaptational processes and on child adjustment. As a consequence, the fit of Model 2 was better but still not satisfactory: CHISQ =193.12 ($df=84$, $p < .01$) and RMSEA=.090 (90 % CI=[.073, .107]).

To further improve the fit of the TSC model, we added direct effects step-by-step, as suggested by modification indices and based on substantive considerations. We introduced a direct effect of the ill parent's gender on children's alienation from father and stress. Long illness duration seems to decrease the quality of marital relationship and child adjustment, so these effects were added as well. Three effects of the ill parent's quality of life on child adaptational processes were entered, that is, a negative effect of physical functioning on illness tasks, a negative effect of social functioning

on daily hassles, and a negative effect of parental depression on frequency of social support. Active problem solving has a negative effect on children's stress and self-esteem. Frequency of social support shows a negative effect on self-esteem, so these effects were also entered. Finally, we added a positive effect of children's daily hassles on child-report of stress. Other associations between child adaptational processes and child adjustment were removed. The modifications resulted in Model 3 that fitted the data closely: $\text{CHISQ}=151.84$ ($df=100$, $p<.01$) and $\text{RMSEA}=.057$ (90 % $\text{CI}=[.038, .075]$).

To obtain a clear picture, we subsequently removed effects that were not significant at the 20 % level ($p>.2$), resulting in the final TSC model, Model 4: $\text{CHISQ}=225.21$ ($df=183$, $p=.02$) and $\text{RMSEA}=.038$ (90 % $\text{CI}=[.017, .054]$); see Fig. 3 for a graphical display and Table 2 for the parameter estimates. Model 4 includes (A) effects of illness parameters on the ill parent's quality of life, (B) effects of illness parameters on child adaptational processes, (C) effects of demographic parameters on the ill parent's quality of life, (D) effects of demographic parameters on child adaptational processes, (E) effects of the ill parent's quality of life on family functioning, (F) effects of family functioning on child adaptational processes, and (G) effects of child adaptational processes on child adjustment. Standardized parameter estimates of effects that were significant at the 5 % level are given in Table 2.

Discussion

The aim of this study was to test the tenability of the Transactional Stress and Coping (TSC) model in adolescents with a parent suffering from a CMC. Accordingly, we examined possible mediators in the relationship between illness and demographic parameters and adolescent internalizing problems. The results show that the ill parent's quality of life, family functioning, and child adaptational processes act as mediators in this relationship. Child adaptational processes are accorded a central role as they seem to mediate the relationship between illness parameters, the ill parent's quality of life, and family functioning, and the child's internalizing problems. The

Fig. 3 Final transactional stress and coping model for children with parental chronic medical condition (model 4)

Table 2 Standardized effects in the final transactional stress and coping model for children with parental chronic medical condition (model 4)

	Effect	S.E.	<i>p</i>
A) Illness parameters on the ill parent's quality of life			
Unpredictability of illness on social functioning	-.41	.07	.000
Unpredictability of illness on role limitations (physical)	-.21	.10	.037
Unpredictability of illness on bodily pain	-.44	.08	.000
Unpredictability of illness on health perception	-.38	.10	.000
Unpredictability of illness on depression	.44	.09	.000
B) Illness parameters on child adaptational processes			
Illness duration on active problem solving	.18	.07	.011
Illness duration on frequency of social support	-.26	.07	.000
Unpredictability of illness on social support seeking	-.14	.07	.040
C) Demographic parameters on the ill parent's quality of life			
Child's age on role limitations (physical)	.15	.07	.026
Child's age on depression	-.14	.07	.033
Ill parent's gender on social functioning	.37	.15	.012
Ill parent's age on physical functioning	-.20	.09	.017
D) Demographic parameters on child adaptational processes			
Child's gender on social support seeking	.30	.13	.025
Child's gender on frequency of social support	.42	.15	.006
Child's age on active problem solving	.18	.06	.007
E) Ill parent's quality of life on family functioning			
Bodily pain on quality of marital relationship	.16	.07	.034
Bodily pain on child's alienation from mother	-.23	.11	.028
Role limitations (emotional) on child's alienation from father	-.25	.10	.013
Bodily pain on child's alienation from father	-.23	.09	.012
Health perception on child's alienation from mother	.23	.11	.031
Depression on quality of marital relationship	-.60	.09	.000
F) Family functioning on child adaptational processes			
Quality of marital relationship on daily hassles	.15	.07	.045
Child's alienation from mother on daily hassles	.39	.09	.000
Child's alienation from mother on self-esteem	-.26	.08	.001
Child's alienation from father on social support seeking	-.16	.06	.013
Child's alienation from father on daily hassles	.28	.10	.004
G) Child adaptational processes on child adjustment			
Daily hassles on internalizing problems	.31	.10	.002
Stress on internalizing problems	.39	.09	.000
Additional effects			
Illness duration on quality of marital relationship	-.17	.07	.012
Illness duration on internalizing problems	.11	.06	.044
Ill parent's gender on child's alienation from father	.47	.17	.004
Physical functioning on illness tasks	-.38	.09	.000
Social functioning on daily hassles	-.21	.06	.000

Table 2 (continued)

	Effect	S.E.	<i>p</i>
Depression on frequency of social support	−.36	.08	.000
Child's alienation from mother on internalizing problems	.20	.08	.017
Active problem solving on self-esteem	.32	.08	.000
Daily hassles on stress	.73	.05	.000
Active problem solving on stress	−.17	.06	.003

Letters A to G indicate direct effects and correspond with the same letters as in Fig. 3

TSC model for children with parental CMC seems to be tenable despite the fact that several adaptations were required, such as restricting the model and interchanging the position of the ill parent's quality of life and family functioning. The final model as shown in Fig. 3 does not have exact fit, but the model fit indices confirm good fit.

To explain child adjustment to parental CMC, especially the ill parent's depression, quality of parent attachment, and children's daily hassles and stress appear to be important measures. Convincingly, the strongest effect of our path model is observed between children's daily hassles and child report of stress, confirming the stress and coping theory that underscores the undeniable role of stress appraisal in adaptational processes (Lazarus and Folkman 1984). The standardized estimates indicate that quality of parent attachment, children's daily hassles affecting personal life, and child report of stress constitute the strongest direct effects on adolescent internalizing problems, which is in line with previous studies (Pakenham et al. 2006; Sieh et al. 2011, 2012b).

With regard to illness parameters, long illness duration seems to be directly related to higher internalizing problem scores, which is in line with a review of 19 studies (Sieh et al. 2010a). This finding further supports the delayed-effect hypothesis from Forehand et al. (1998), meaning that longer illness duration can be related to the depletion of resources, which exposes children to an increased risk for anxiety, depression, withdrawn behavior, and somatic complaints. The results also reveal that unpredictability of parental illness is linked to lower health-related functioning and more depressive symptoms in ill parents. On the one hand, it may be argued that unpredictability of illness is an early risk factor for adverse child outcomes because it can be classified at the start of the illness process when the diagnosis is assessed. On the other hand, unpredictability of illness may reduce the ill parent's quality of life slowly, leading to an accumulation of stress, which acts on child adjustment years after the diagnosis (Sieh et al. 2012a).

Concerning demographic parameters, we did not find that girls display elevated stress in comparison with boys, as opposed to findings from a stroke study (Sieh et al. 2010b). However, because girls exhibit more coping skills and more frequent social support than boys, they may compensate for supposedly elevated stress levels. This underlines the need to consider stress and coping simultaneously. A meta-analysis found that gender differences regarding internalizing problems in children with parental CMC are negligible (Sieh et al. 2010a). Our findings confirm that gender of the child does not influence adolescent internalizing problem scores directly. Again, the role of stress and coping can explain the absence of direct gender effects.

In contrast to the meta-analysis by Sieh et al. (2010a), financial resources do not seem to be significantly involved in adaptational processes in response to parental illness. In our study, SES was only operationalized with family income, which may explain the absence of a significant effect. In addition, most families in our sample had a relatively high income, implying low variance in SES and possibly few financial problems. Although a direct or indirect relationship between SES and internalizing problems is absent in this study, SES should not be discarded as background variable. Further, we can conclude that ill parents' gender and age may influence the ill parent's quality of life. Women with CMC seem to display higher social functioning. Female gender of ill parents is linked to greater alienation between children and fathers, illustrating that the effects of gender-matching remain an interesting object of study among families dealing with CMC (Korneluk and Lee 1998).

We found little support that the relationship between family functioning and the ill parent's quality of life is bidirectional. In contrast, lower quality of life seems to decrease the quality of family relationships. Interestingly, our findings suggest that the ill parent's depressive symptoms have a strong direct effect on the quality of marital relationship, contradicting research suggesting a bidirectional relationship (D'Onofrio and Lahey 2010). In turn, from our final model it can be deduced that higher social and physical functioning of ill parents, higher marital functioning, and less alienation between children and parents are connected to more functional child adaptational processes.

Moving on to child adaptational processes, there was little evidence that coping skills and frequency of social support are mediators for adolescent internalizing problems unlike our expectations derived from the TSC model. The results suggest that active problem solving and social support seeking are related to children's self-esteem and stress, implying a mediating effect within child adaptational processes. A study found that the relationship between coping and child adjustment to illness was significant, whereas stress appraisal and child adjustment outcomes were unrelated (e.g., Pakenham et al. 2007). In contrast, we found that not children's coping skills but cognitive processes such as perceived daily hassles contribute to adolescent internalizing problems directly. The reason for this discrepancy may be due to the choice of instruments. Pakenham et al. measured global distress instead of children's problem behavior. In comparison with the wide array of coping skills assessed by Pakenham et al., we only measured active problem solving, social support seeking behavior, and frequency of social support. Research on coping skills in adults includes a review of 48 studies on patients with spinal cord injury (Van der Leeuwen et al. 2012), demonstrating non-significant associations between active problem solving coping and quality of life outcome measures of the patient. In contrast, most passive coping variables like mental disengagement and drug use were significantly related to greater anxiety and depression of the patient. A study on 187 spouses of stroke patients (Visser-Meily et al. 2005c) concluded that passive coping was the strongest predictor of outcome measures such as burden, life satisfaction, and depression of the spouse. On the contrary, coping skills like seeking social support, active confronting, and expressing emotions were not associated with the mentioned outcome measures. These findings among adult caregivers and patients possibly apply to children as well, so it may be hypothesized that passive coping, as opposed to active coping, would show significant relationships with elevated stress levels and more problem

behavior in adolescents with parental CMC. Future research should clarify the role of the child's active and passive coping in this respect.

The strength of the study is that it is the first applying structural equation modeling in the field of child adjustment to parental CMC, while accounting for the statistical dependence between the scores of family members. A few limitations of this study should also be noted. First, the sample size was relatively small considering structural equation modeling of the present number of variables. Nevertheless, our data did not suggest overfitting regarding the number of degrees of freedom and we could establish good model fit (Bollen 1989). Second, our sample was selective concerning the fact that parents were not equally distributed by medical diagnoses. Also, most participants (had) received support from rehabilitation centers and all families were from western societies. The generalizability of our results may therefore be limited. Third, we did not measure passive coping such as wishful thinking, nor cognitive strategies with regard to anxious cognitions. Fourth, although we tried to measure process variables assessing the adaption to illness, we cannot rule out that a large part of child outcomes is a consequence of other influences than those of parental illness. Finally, we did not measure behavioral competence as suggested by Hocking and Lochman (2005) and did not follow the operationalization of family functioning according to the TSC model. In this regard, we did not really test the TSC model as originally described. Notwithstanding, behavioral competence has overlap with how we measured child adaptational processes and many studies in the field measured family functioning in our fashion (Korneluk and Lee 1998; Sieh et al. 2010a).

In sum, this study suggests that the ill parent's quality of life, family functioning, and child adaptational processes play an integral part in the child's adjustment to parental CMC. Child adaptational processes, especially daily hassles and stress, are accorded a central role in the mediating processes of the revised TSC model. While coping skills do not appear to be directly related to adolescent internalizing problems, they seem to interfere with children's self-esteem and psychological stress levels. Our results confirm the tenability of the TSC model, offering suggestions for possible interventions.

We advocate a family-centered approach which has consideration for the impact of parental CMC on the whole family (Visser-Meily et al. 2006). Possible targets for family-based interventions ideally focus on the ill parent's quality of life, interpersonal family relationships, and adaptational processes of family members. Parents may benefit from education about the role of parenthood or from parenting support. Interventions for children with parental CMC should incorporate the child's coping skills, cognitive processes, and perception of stress. Interventions boosting protective factors such as active problem solving skills, social support, and high self-esteem appear to be suitable. Family psychoeducation combined with stress management may help through the process of adapting to parental CMC. Health professionals are recommended to pay attention to support needs, while being alert that children do not estrange from their parents. Children may require information about how to appraise illness-related stressors and how to deal with anxieties associated with their own health and the health of their parents. Future research is required to design and test the effectiveness of specific individual and family interventions. Health practitioners need to make sure that children are protected from adverse outcomes associated with parental CMC.

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