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At Risk? – Prediction of Problem Behavior in Adolescents with Parental Chronic Medical Condition and Depressive Symptoms

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Abstract

Depressive symptoms are prevalent amongst parents suffering from chronic medical conditions (CMC), such as multiple sclerosis or brain damage. This study examined the combined impact of having parents with CMC and increased depressive symptoms on clinical outcomes of adolescent internalizing problem behavior. Self–report data from Dutch adolescents (ten to 23 years old) on the Youth Self–Report (YSR) were compared between four samples: adolescents of parents affected by CMC (135 adolescents, mean age = 14.61 years), mental disorders (25 adolescents, mean age = 18.04 years), and two respective comparison groups with healthy parents (114 adolescents, mean age = 14.54 years; 114 adolescents, mean age = 17.94 years). Adolescents of parents with CMC were divided using ill parents' scores on the Beck's Depression Inventory (BDI), yielding a target group of parents with CMC and minimal depressive symptoms and a target group of parents with CMC with light to severe depressive symptoms. Adolescents dealing with parental CMC showed more internalizing problem behavior and were more likely to score in the clinical range than adolescents with two healthy parents. Adolescents of parents with CMC and co–occurring depressive symptoms had highest mean scores and scored most frequently in the clinical range of internalizing problem behavior especially on the subscale of anxious/depressed internalizing problem behavior. This study points to the relevance of early screenings and identification of adolescents at risk for developing problem behavior, in order to afford them to benefit from professional interventions as early as possible.

Keywords: Parental chronic medical condition, parental mental disorder, internalizing problem behavior, anxious/depressed, adolescent, depressive symptoms

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In 2007, approximately four to 15 percent of children and adolescents in Western societies between age four and 18 lived with at least one parent suffering from a chronic medical condition (Barkmann, Romer, Watson, & Schulte–Markwort, 2007). As the prevalence rate of patients with a chronic medical condition (CMC) is continuously rising, this statistic may be underestimated by now (Barkmann et al., 2007). The term CMC defines a group of diseases including symptoms that have to be present for at least six months, involving one or more organ systems, causing functional impairment and having persistent effects on health and psychological well–being (Brown, 2006). These effects may not only have an impact on personal circumstances but may also entail immediate consequences for the spouse and children. Indeed, Rolland (1990; 1994) claimed that CMC in one parent creates emotional and practical demands for all family members, confronting each member with the defiance of adjustment to the new circumstances. Likewise, families that included one parent diagnosed with CMC appeared to show more depressive symptoms in patients and spouses compared to families with two healthy parents (Sieh, Visser–Meily, & Meijer, 2013b).

So far, only limited attention has been drawn to children of parents suffering from CMC, an observation that is confirmed by the low number of studies examining the impact of having parents with CMC on children and adolescent functioning (Umberger et al., 2014). Nonetheless, it is important to consider the well–being of children who live with parents suffering from CMC, as those children have to adapt to the situation of one parent not being responsive or physically and emotionally available (Bowlby, 1983). In daily practice, a child with a parent affected by CMC, may feel abandoned and left alone by the parent when parents leave frequently to go to the hospital.

Taking the family system’s theory into account, these consequences of having parents with CMC may be interpreted as originating from the emotional connectedness of family

members. Each individual family member can be seen as a part of the family, described as a unified system and a complex unit comprising of multiple interactions (Bowen, 1966). It was verified that negative changes concerning the functioning of one family member will elicit distress for all other family members, leading to dysfunctional behavior and behavioral problems (Bowen, 1966). Parental CMC may work as such a negative change, as the practical, emotional and physical unavailability and the decreased responsiveness of the chronically ill parent will trigger the experience of emotional distress for all other family members and poses a threat to the stability and connectedness of the family system (Mehta, Cohen, & Chan, 2009).

As a reaction to and to compensate for the limitation in emotional and physical functioning of the ill parent, family roles are newly distributed, usually in a way that the healthy parent takes on all responsibilities of the ill parent, leading to changes in the traditional family roles and increased stress (Pedersen & Revenson, 2005). Simultaneously, these changes in the familial system impact the child. Particularly, when the healthy parent is not able to take on the responsibilities due to own problems or health condition, children are likely to face increased responsibility for household chores and care giving (Sieh et al., 2013b). Moreover, children have to cope with the threat of possibly losing a parent and the unpredictability of parental health, caring for younger siblings, and have to face changing routines and schedules and the depletion of financial resources (Armistead, Klein, & Forehand, 1995; Sieh et al., 2013b). This leaves adolescents growing up with one parent suffering from CMC confronted with demands which may exceed age-appropriate responsibilities and at increased risk of chronic stress and requires professional help of early intervention (Bowen, 1966).

Early research suggested that moderate levels of distress, academic problems, behavioral problems and increased levels of depression and anxiety in adolescents are associated with parental CMC and are not as prevalent in adolescents with two healthy

parents (Armsden & Lewis, 1994; Korneluk & Lee, 1998; Sieh, Meijer, Oort, Visser–Meily, & Van der Leij, 2010). Compas et al. (1994) and Sieh, Visser–Meily, Oort, and Meijer (2012) investigated anxiety, depression and stress responses in 110 children of adult cancer patients in order to identify their risk for clinically relevant psychological maladjustment. Both found that the proportion of depressive and anxious symptoms falling in the clinical range was significantly greater for children of at least one chronically ill parent compared with children of two healthy parents.

As children who display behavioral problems are more likely to encounter negative future outcomes persisting into adulthood, such as elevated depressive symptoms, insecurity, or distorted interpersonal relations, it is important to examine the significant impact of having a parent with CMC on problem behavior in the child in more detail (Verhaeghe, Defloor, & Grypdonck, 2005). Therefore, internalizing problem behavior, characterized by behavior directed towards the self, such as feelings of worthlessness, dependency, depressive symptoms, anxiety, social withdrawal and somatic symptoms (Achenbach & Edelbrock, 1978), and externalizing problem behavior, specified by social issues, difficulties with interpersonal relationships, acting out, and showing aggressive and rule–breaking behavior (Diareme et al., 2006), has been distinguished by developmental researchers (Cicchetti & Toth, 1991). Although externalizing problem behavior may be relevant in determining risk factors of child behavioral problems associated with having a parent with CMC, this present study will focus on internalizing problem behavior exclusively, as literature pointed to the particularly high prevalence of internalizing problem behavior in children confronted with a parent suffering from CMC (Armistead et al., 1995; Sieh et al., 2010).

Furthermore, attention needs to be drawn to parental psychological functioning. Barkman et al. (2007) explored the risk for psychosocial maladjustment in a sample of German children, four to 18 years of age (N = 1950), with 4.1 percent (N = 79) of the children dealing with a parent suffering from CMC and 2.3 percent (N = 44) by parents suffering from

a mental condition. They concluded that compared to a parent with CMC, a parent suffering from a mental condition posed a higher risk for children's psychosocial maladjustment, caused by parental mood swings, irritability and disorganized parent child interactions. A higher need for clinical assessment, counseling and treatment in those children as early as possible has often been recommended (Sieh, Visser–Meily, & Meijer, 2013a).

Moreover, numerous studies have already highlighted the risk which parental Major Depressive Disorder (MDD) confers to children, emphasizing their increased rates of behavior problems and elevated risk to develop psychopathological problems (Beardslee, Versage, & Gladstrone, 1998; Downey & Coyne, 1990; Goodman & Gotlib, 2002). Research by Weissman et al., (2004) found that children of depressed patients showed an increased risk for developing MDD and several other psychopathological conditions, compared to children with two healthy parents. Similarly, Goodman and Gotlib (2002) identified that parental MDD would negatively impact general family functioning and emotional adjustment, leading to increased levels of internalizing problem behavior in adolescence and early childhood. As a consequence, internalizing problem behavior in young children is likely to interfere with the ability to efficiently cope with developmental challenges in later adolescence and may heighten the risk for future depressive outcomes (Weissman et al., 2005). Pettit, Olino, Roberts, Seeley, & Lewinsohn (2008) acknowledged that increased levels of internalizing problem behavior in the child were associated with a history of parental MDD. More specifically, children's scores on the anxious/depressed subscale of internalizing problem behavior were highly correlated with parental MDD, in contrast to scores on the somatic symptoms subscale (Pettit et al., 2008).

So far only a few initial studies focused their attention on the combined effects of parental CMC and parental depressive symptoms on adolescent internalizing problem behavior (Umberger et al., 2014). Still, research established that children with parents affected by CMC, whose parents were additionally showing increased levels of depressive symptoms,

were more likely to score in the clinical range of internalizing problem behavior than children whose parents suffered from CMC only, or children with two healthy parents (Diareme et al., 2006; Sieh et al., 2013b). Studies investigating similar interrelations revealed that parental depressive symptoms were associated with high levels of perceived stress by the child, leading to increased levels of problem behavior when the child had one parent with CMC, underpinning the importance of considering parental depressive symptoms as a possible predictor of child adjustment to parental CMC (Armistead et al., 1995; Biggar & Forehand, 1998; Diareme et al., 2006; Lee & Gotlib, 1989).

To address these issues, the aim of this study is to increase insight into risk factors that may predict the development and the clinical severity of internalizing problem behavior in adolescents. Therefore, internalizing problem behavior of adolescents with parents affected by CMC and additionally moderate to severe depressive symptoms will be compared to adolescents of parents suffering from CMC and low to mild depressive symptoms or mental disorders. Distinctively, scores on the subscales of internalizing problem behavior will be inspected separately and the likelihood of adolescents affected by parental CMC and depressive symptoms to exhibit such behaviors will be compared to adolescents with parental mental disorders. Hereby, adolescents at risk for developing behavioral symptoms falling in the clinical range can be identified and helped by early screening and intervention and prevention programs implemented by professionals in order to prevent poor adolescent functioning and persistent problems (Sieh et al., 2013a).

The review of theoretical and empirical groundwork led to the following hypotheses: (1) adolescents affected by parental CMC or (2) parental mental disorder will show higher levels of overall internalizing problem behavior and anxious/depressed symptoms and will be more likely to score in the clinical range of internalizing problem behaviors and anxious/depressed symptoms compared to adolescents of two healthy parents; (3) adolescents of parents with mental disorders will show higher levels of overall internalizing problem

behavior and anxious/depressed symptoms and will be more likely to score in the clinical range of internalizing problem behavior compared to adolescents with parental CMC; adolescents of parents with CMC and moderate–severe depressive symptoms will show higher mean scores on overall internalizing problem behavior, more anxious/depressed than somatic internalizing problem behaviors, and will be more likely to score in the clinical range of internalizing problem behaviors compared to (4) adolescents of parents with CMC and minimal–mild depressive symptoms and (5) adolescents of parents with mental disorders (see Figure 1).

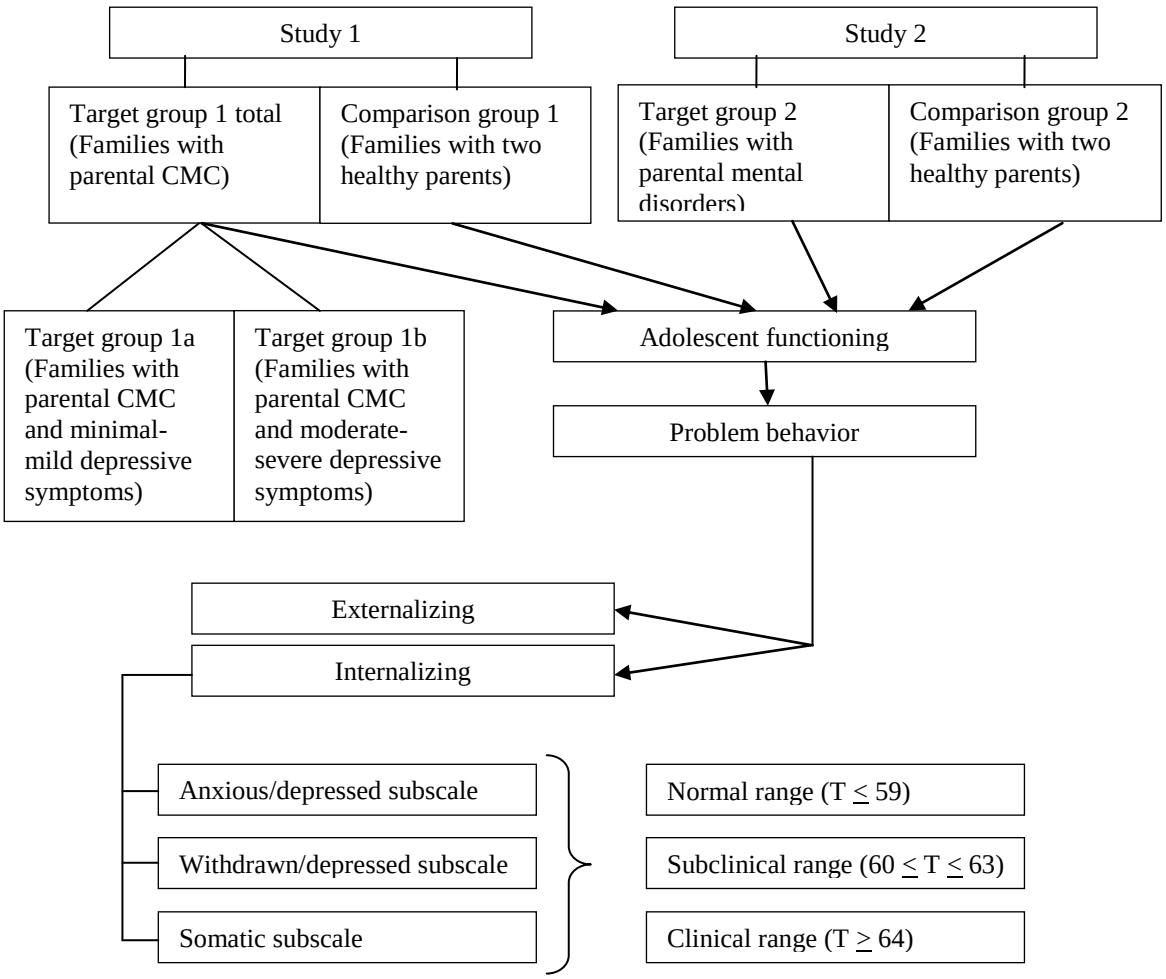

Figure 1. Illustration of adolescent internalizing problem behavior in association with parental conditions.

Method

Participants

Adolescents of both studies had to live at home with their families, have a good command of Dutch, and should not have a diagnosis of a severe chronic illness.

Participants of the present study were 388 adolescents from ten to 23 years of age and their parents. As a requirement for participation, adolescents had to be living at home together with both of their parents. Of the total adolescents, 135 had at least one parent with a CMC lasting for six months or longer causing functional impairment. This group was further divided into the target groups of 31 adolescents with parental CMC and additionally minimal–mild depressive symptoms and 104 adolescents affected by parental CMC and additionally moderate–severe depressive symptoms. For this study, 114 adolescents composed the first comparison group and lived in families with two healthy parents (see Figure 2).

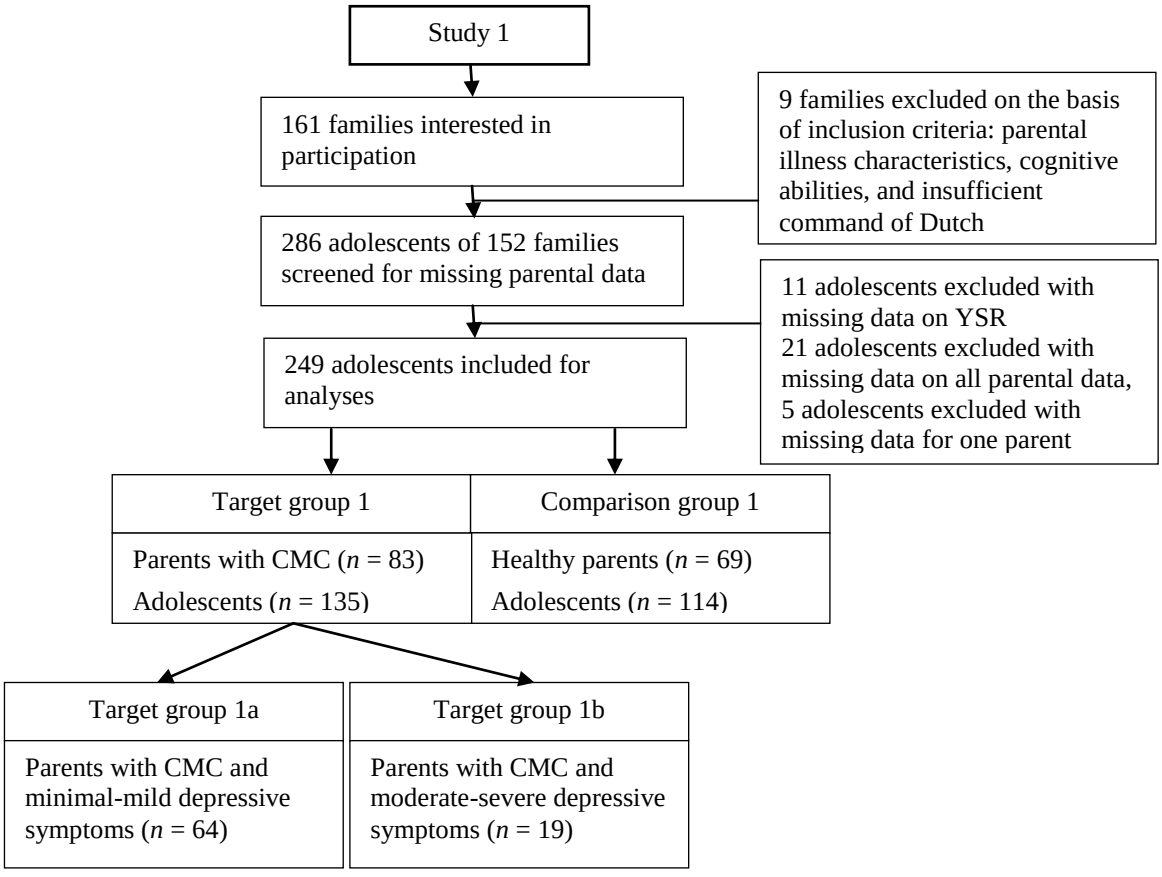

Figure 2. Inclusion procedure for adolescents with parental CMC.

Further a second study recruited a target group of 25 adolescents, who lived in families with one parent suffering from a mental disorder and a comparison group of 144 adolescents, who had two health parents (see Figure 3).

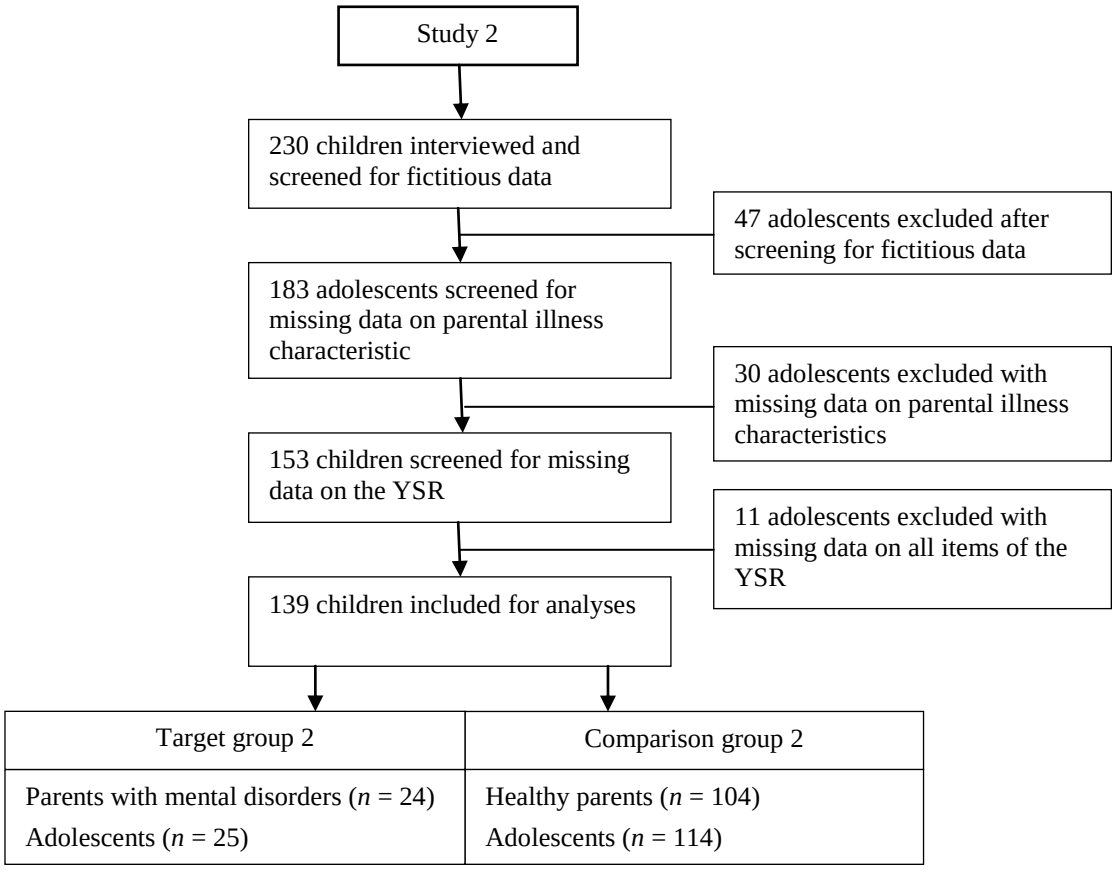

Figure 3. Procedure of recruitment for adolescents with parental mental disorders.

Instruments

Demographic Data. Questions related to the personal situation, such as date of birth, gender, education, failed years at school, living situation, income, employment status and illness characteristics (type and duration) were asked to adolescents and parents (Sieh et al., 2012).

Adolescent Problem Behavior. The Youth Self–Report (YSR) by Achenbach (1991) was used to measure internalizing problem behavior of adolescents. The questionnaire contains 31 questions addressing internalizing problem behavior, for example: *I worry a lot, I*

have nightmares, *I don't have much energy*, and *there is very little that I enjoy*. Answers were rated using a four–point scale from *not true* (0), *somewhat/sometimes true* (1) to *very/ often true* (2). Total scores for internalizing problem behavior ranged from 0 to 62, with higher scores indicating lower overall functioning of the adolescent and higher levels of internalizing problem behavior. A score of 62 marks the highest score, specifying internalizing problem behavior of the adolescent at the most severe and clinical range. Internalizing problem behavior is further divided into the subscales *anxious/depressed behavior* (16 items), *withdrawn/depressed behavior* (7 items), and *somatic complaints* (9 items). For the present study, Cronbach's alpha is illustrated in Table 1 for adolescent total scores of internalizing problem behavior and each subscale separately. Verhulp, Stevens, van de Schoot, and Vollebergh (2014) revealed a high reliability for the scale of internalizing problem behavior, with Cronbach's α = .88. Similarly, Sieh et al. (2012) demonstrated high reliability scores for internalizing problems (α = .91).

Parental Depressive Symptoms. In order to measure parental depressive symptoms, the Beck Depression Inventory (BDI) was used. The BDI includes 21 questions related to affective, cognitive, behavioral and somatic symptoms of depression. Participants were asked to answer each question using a four–point scale ranging from 0 (*I do not feel sad; I do not feel like a failure*) to 3 (*I am so sad or unhappy that I cannot stand it; I feel I am a complete failure as a person*), as Beck, Ward, Mendelson, Mock, and Erbaugh (1961) originally proposed. Sum scores of the BDI can range from 0 to 42, with 42 indicating severe depressive symptoms. The following standardized cut–off–scores were used to determine the severity of depressive symptoms: 0–10 for *minimal*, 11–17 for *mild*, 18–23 for *moderate* and 24–42 for *severe depressive symptoms* (Beck, Steer, & Carbin, 1988). Internal consistency for the BDI scores of families with a chronically ill parent was α = .86 and α = .81 for healthy parents (Beck et al., 1988). In order to calculate the test–retest reliability, correlations of scores attained by testing at first and second therapy session were calculated and a correlation of .93,

indicated sufficient test–retest reliability (Beck et al., 1961). For this study, reliability scores are represented in Table 1.

Table 1

Psychometric Properties for the YSR and the BDI

	Items	Range	Internal consistency (Cronbach's Alpha)				
	(*n*)		Target group 1a	Target group 1b	Comparison group 1	Target group 2	Comparison group 2
Internalizing problem behavior (YSR)	31	0-62	.90	.91	.77	.91	.89
Anxious/depressed	16		.89	.90	.73	.92	.88
Withdrawn/depressed	7		.69	.51	.59	.78	.76
Somatic complaints	9		.69	.83	.61	.61	.15
Parental depressive symptoms (BDI)	21	0-42	.56	.63	.79	–	–

Note. *n* = number of cases, YSR = Youth Self Report, BDI = Beck Depression Inventory.

Procedure

The first study including target group 1a, 1b and comparison group 1 has been approved by University of Amsterdam, Ethics Committee of the Research Institute of the Department of Child Development and Education on December 2, 2008. The study including families with parental mental disorders and two healthy parents has been authorized by the Ethics Committee of the Department of Psychology (CEP) by the University of Leiden, the Netherlands in 2014. The design of both studies was cross–sectional. In both studies, debriefing according to the guidelines for the Ethical Principles of Psychologists and Code of Conduct (2016) was implemented for all participants after the studies were completed.

Recruitment for the first study of parents with CMC was conducted between September 2008 and April 2011 (Sieh et al., 2013a) across the Netherlands. Public schools, community centers, general health practitioner's offices, public libraries, hospitals, rehabilitation centers, national health institutions and other institutions were contacted in order to recruit participants. Families interested in participating in the research obtained additional information about the study after Pakenham and Cox (2014). Written informed

consent was acquired from the participating adolescents and parents. For children under the age of 18, informed consent by one or both parents was required; for children below the age of 12 both parents were required to give informed consent. Further, questionnaires were administered by research assistants trained to follow the study's protocol, who visited participating families at home. After participating in the study, adolescents were provided with a voucher, cinema ticket or small gift as compensation for their cooperation.

Participants for the second study, including parents with mental disorders, were recruited only in Leiden between 2011 and 2015. Flyers were distributed at public schools, community centers, general health practitioner's offices, public libraries, hospitals, rehabilitation centers, national health institutions and other institutions in order to recruit participating families. Families could contact the research team via e–mail. After written consent was signed by participating adolescents themselves, or their parents in case of being under age, adolescents filled in the online questionnaires. Parental information was not obtained. After the successful conduction of the study, a lottery was performed with a chance to win four gift cards of 25 € worth each.

Statistical Analyses

Preliminary Analyses. In the process of analyzing the collected data, results were derived using IBM SPSS Statistics version 23.0 for Windows. Descriptive statistics and average mean scores on internalizing problem behavior and all subscales were obtained by using raw scores of the YSR. For further analyses, raw scores on the YSR were manually transformed into standardized T–scores to allow comparisons of range frequencies between all groups (Achenbach, 1991). The range of T–scores between 20 and 59 defined the *normal* range of internalizing problem behavior, T–scores in the range of 60 to 63 were composed the *subclinical,* and scores greater than 64 determined the *clinical* range of internalizing problem behavior, as suggested by Achenbach (1991).

Several adolescents in the CMC sample (5.4%) and in the sample with parental mental disorders (17.5%) had at least one item in the YSR missing. In contrast to Pakenham and Cox (2014), Multiple Imputation was chosen to acquire a complete data set, which will increase power of any following statistical tests (Peeters, Zondervan–Zwijnenburg, Vink, & van de Schoot, 2015; Janssen et al., 2010). The Little's Missing Completely at Random (MCAR) test revealed that data was missing completely at random for the sample including adolescents with parental mental disorders, (χ^2 = 2201.69, *df* = 2043, $p > .05$), but not for adolescents of the sample including parental CMC (χ^2 = 1677.83, *df* = 1173, $p < .05$). However, no specific patterns of missing data were identified by examining pattern frequency graphs, implying that data may still be missing at random, allowing Multiple Imputation. For missing items on the somatic subscale of internalizing problem behavior in the sample of parents with mental disorders, Multiple Imputation was conducted using the average scores of the remaining items as predictors. Missing items on parental BDI scores did not exceed a five percent exclusionary limit (Bennett, 2001), thus missing values for parents did not reach the necessity for data imputation. In order to identify potentially influential data points of the T–scores for adolescents YSR measures, Cook's distance was measured for each score of internalizing problem behavior. As Cook's distance for all outliers in all target and comparison groups was below 1, the outliers were not influential and none of the participants had to be excluded (Field, 2013).

All observations were independent from each other, as participants were measured only once and separately and responses of one participant could not influence the response of any other participant (Cohen, Cohen, West, & Aiken, 2003). Also, the assumption of normality for adolescent internalizing problem behavior scores on the YSR and BDI scores for parents was examined using the Shapiro–Wilk test of normality, box–plots of residuals, histograms and Q–Q plots. According to the Central Limit Theorem, deviations from normality are negligible in case of a large sample size (Singh, Lucas, Dalpatadu, & Murphy,

2013). For the present study, the sample size exceeded 30 observations, leading to the assumption that the distribution of the sample means was normal. Likewise, the assumption of homogeneity of variance was met in all relevant groups, indicating equal variances for adolescents internalizing problem behavior scores on the YSR in all target and comparison groups. Levene's test for parental total BDI scores revealed that variances of scores did significantly differ between the groups.

Preexisting differences between all five target and comparison groups regarding number of adolescents per family, age, gender of the parent and education level, GPA, religiousness, time since diagnosis, time together with partner, illness types, occupation of parent and monthly income were examined by conducting Analyses of Variances (ANOVAs), with a significance level of $\alpha = .01$.

To continue, mean scores of parental depressive symptoms were compared between parents of families affected by parental CMC and families with two healthy parents by an independent samples *t*–test. Finally, depressive symptoms of the parents affected by CMC were compared to those of the healthy partners by another independent samples *t*–test.

Main Analyses. Items of all subscales for internalizing problem behavior of adolescents were summed up and the total scores were focused on. Subsequently, the scores for each individual subscale of internalizing symptoms of problem behavior were analyzed separately. Independent samples *t*–tests were conducted to determine the effect of parental illness characteristics on child internalizing problem behavior and investigate differences between the groups' mean scores. Accordingly, using independent samples *t*–tests with a significance level of $\alpha = .05$ it was compared whether adolescents of parents with CMC or parental mental disorders showed higher levels of internalizing problem behavior and anxious/depressed symptoms compared to adolescents with two healthy parents, testing the first two hypotheses. In order to compare internalizing problem behavior and

anxious/depressed symptoms between adolescents of families with parental CMC and mental disorders, another independent samples *t*–test was conducted.

To test, whether adolescents of parents with parental CMC or mental disorders had higher mean scores on the anxious/depressed than somatic internalizing problem behavior subscale, independent samples *t*–tests were used. Additional independent samples *t*–tests were used to examine internalizing problem behavior for adolescents of parents with CMC and minimal–mild depressive symptoms in contrast to adolescents of parents with CMC and moderate–severe depressive symptoms. Analyzing between group variances, χ^2–tests with α = .05 as criterion for significance were used to test whether proportions of scores in the clinical range of internalizing problem behavior and anxious/depressed symptoms were higher in adolescents of parents with CMC, parental mental disorders, or parental CMC with additional moderate–severe depressive symptoms compared to adolescents of two healthy parents and parents affected by CMC with minimal–mild depressives symptoms.

Cohen's d was calculated as standardized effect size measurement and was used to examine the magnitude for effects of parental conditions on child internalizing problem behavior. In order to analyze the effect sizes, we chose to follow the standard interpretation of a large effect (d = 0.8), medium (d = 0.5) and a small effect (d = 0.2) proposed by Cohen (1992).

Results

Demographic differences between groups of adolescents

The general demographic characteristics of adolescents and their parents are summarized in Table 2. Adolescents with parental mental disorders were significantly older, $F(4,381) = 32.64$, $p = .00$, and showed a higher percentage of female participants than adolescents with parental CMC, $F(4,383) = 7.27$, $p = .00$. The majority of adolescents and parents were Caucasian and of Dutch origin; only four adolescents were not from the Netherlands. Adolescents did not differ in number of failed school years, but adolescents with

two healthy parents showed higher grade point averages compared to adolescents of parents with CMC or mental disorders, $F(4,379) = 349.88$, $p = .00$. In the sample of families with parental mental disorders, adolescents showed a significantly higher education level of being mainly at university level compared to adolescents with parental CMC (see Table 2).

Table 2

Descriptive Statistics for Families of All Target and Comparison Groups

	Target group 1a	Target group 1b	Comparison group 1	Target group 2	Comparison group 2
Number of families (*n*)	64	19	69	24	104
Number of adolescents per family (*SD*)	1.45 (0.65)	1.48 (0.68)	1.51 (0.73)	1.04 (0.20)	1.18 (0.71)*
Adolescents (*n*)	104	31	114	25	114
Gender (female)	55.8%	45.2%	52.6%	84.6%	78.4%*
Mean Age (*SD*)	14.67 (2.43)	14.42 (2.31)	14.54 (2.25)	18.04 (4.16)	17.94 (3.17)*
Mean education level[1] (*SD*)	6.72 (3.42)	6.42 (3.17)	7.35 (3.05)	9.42 (1.45)	9.01 (2.42)*
Elementary school	17.7%	12.9%	12.3%	0%	6.0%
University	2.3%	3.2%	2.6%	76.9%	75.0%
Failed at least one year at school	16.3%	17.4%	15.8%	19.2%	19.0%
Mean grade point average[2] (*SD*)	6.94 (0.79)	6.87 (1.06)	7.25 (0.77)	6.84 (0.62)	6.94 (0.78)
Parents (*n*)	64	19	138	–	–
Gender (female)	57.8%	73.7%	50.0%*	–	–
Mean age (*SD*)	47.13 (5.76)	46.42 (5.53)	47.30 (5.08)	–	–
Average years since diagnosis (*SD*)	19.46 (11.59)	15.21 (8.16)	–	–	–
Years together with partner (*SD*)	21.22 (4.48)	21.04 (5.54)	20.29 (6.30)	–	–
Mean hours of work per week (*SD*)	20.43 (12.99)	9.67 (7.89)	31.38(12.03)*	–	–
Mean netto income in Euro (€)	2500–2999	2000-2499	3000–3499*	–	–

Note. CMC = Chronic Medical Condition, MBO = lower vocational school, HBO = intermediate vocational school, *n* = number of cases, *SD* = Standard deviation. [1] Education level ranges from 1 = elementary school, to 10 = university education. [2] Grade point average ranges from 4 and below (insufficient) to 9 and higher (excellent). * $p < .01$. All significance tests are conducted using ANOVA.

The sample including parents with CMC contained significantly more families with a second child participating in the study (30.8%), $F(4,383) = 5.63$, $p = .00$, compared to the sample including parents affected by mental disorders (5.3%). Furthermore, mean scores for internalizing problem behavior, $F(4,383) = 6.47$, $p = .00$, for the anxious/depressed, $F(4,383)$

= 5.75, p = .00, the withdrawn/depressed, $F(4,383) = 3.12$, p = .01, and somatic, $F(4,383)$ = 4.15, p = .00, subscale of internalizing problem behavior were significantly different between the groups using raw scores for the analyses. Differences in mean scores on the somatic (p = .43) and withdrawn/ depressed (p = .13) subscale did not reach statistical significance when T-scores were used for the analyses. Overall, adolescents of all target and comparison groups demonstrated a variety in scores falling in the normal, subclinical, and clinical range for total internalizing problem behavior and the anxious/depressed subscale (see Table 3).

Table 3

Internalizing Problem Behavior for Adolescents of All Target and Comparison Groups

	Target group 1 total (n = 135)	Target group 1 a (n = 104)	Target group 1b (n = 31)	Comparison group 1 (n = 114)	Target group 2 (n = 25)	Comparison group 2 (n = 114)
Raw scores						
Total internalizing problems *M* (*SD*)	9.60 (8.41)	8.83 (7.82)	12.18 (9.85)	7.39 (5.03)	14.22 (10.24)	10.82 (8.42)*
Anxious/depressed problems M (*SD*)	4.59 (5.06)	4.13 (4.69)	6.16 (5.97)	3.23 (3.05)	7.12 (6.57)	5.18 (5.17)*
Withdrawn/depressed problems *M* (*SD*)	2.29 (2.19)	2.19 (2.26)	2.61 (1.98)	1.89 (1.73)	3.40 (2.87)	2.43 (2.43)*
Somatic complaints *M* (*SD*)	2.93 (2.89)	2.70 (2.59)	3.68 (3.66)	2.40 (2.13)	4.21(3.98)	3.42 (2.67)*
T–scores						
Total internalizing problems *M* (*SD*)	49.33 (11.98)	48.12 (11.76)	53.45 (11.99)	46.89 (8.02)	54.41 (13.85)	50.44 (11.43)*
Normal range % (*n*)	77.8 (105)	78.8 (82)	74.2 (23)	92.1 (105)	56.0 (14)	78.9 (90)**
Subclinical range % (*n*)	9.6 (13)	10.6 (11)	6.4 (2)	5.3 (6)	12.0 (3)	5.3 (6)**
Clinical range % (*n*)	12.6 (17)	10.6 (11)	19.4 (6)	2.6 (3)	28.0 (7)	11.4 (13)**
Anxious/depressed problems *M* (*SD*)	40.88 (9.43)	39.89 (9.29)	44.19 (9.28)	38.46(7.35)	45.64(13.07)	41.75 (9.28)*
Normal range % (*n*)	94.8 (128)	97.1 (101)	87.1 (27)	100 (114)	80.0 (20)	94.7 (108)**
Subclinical range % (*n*)	2.9 (4)	–	12.9 (4)	–	–	1.8 (2)**
Clinical range % (*n*)	2.3 (3)	2.9 (3)	–	–	20.0 (5)	3.5 (4)**
Withdrawn/depressed problems *M* (*SD*)	38.48 (6.35)	36.05 (6.61)	37.93 (5.21)	35.63 (5.54)	38.76 (7.09)	36.27 (6.26)
Normal % (*n*)	100 (135)	100 (104)	100 (31)	100 (114)	100 (25)	100 (114)
Somatic complaints *M* (*SD*)	37.73 (7.17)	37.29 (6.67)	39.19 (8.58)	36.87 (6.13)	38.73 (8.99)	38.18 (6.92)
Normal % (*n*)	100 (135)	100 (104)	100 (31)	100 (114)	100 (25)	100 (114)

Note. n = number of cases, M = mean scores, SD = standard deviation, YSR = Youth Self Report. T–scores $\leq$ 59 indicate normal cases, T–scores between 60 and 63 indicate subclinical scores, T–scores $\geq$ 64 indicate clinical scores. *$p < .05$. All significance tests of range differences are conducted using a χ^2 – test. **$p < .01$. All significance tests of mean score differences are conducted using ANOVA.

Demographic differences between groups of parents

Age, education level, and relationship duration did not differ between families with parental CMC and families including two healthy parents ($p > .01$). The majority of parents affected by CMC and moderate-severe depressive symptoms were mothers, $F(2,301) = 2.21$, $p = .00$, compared to balanced frequencies of mothers and fathers in the comparison group 1. Four same sex–parented families, with two male parents, were included, as well as two families with both parents suffering from CMC. Families including parental CMC had a significantly lower monthly income (mean difference = 967 € per month), $F(2,301) = 11.52$, $p = .00$, and worked significantly fewer hours per week, $F(2,301) = 7.29$, $p = .00$, compared to families with two healthy parents (see Table 2). Levels of religiousness did not differ significantly between families with parents affected by CMC (44.6% not believing) and families with two healthy parents (43.5% not believing). Mean time since diagnosis ranged from one to 49 years for parents suffering from CMC. Table 4 presents the most frequent diagnoses for parental CMC and mental disorders. Sixteen adolescents (64.2%) in the sample including families with parental mental disorders reported that their parents were suffering from a comorbid CMC.

Table 4

Information about the Type of Parental Chronic Medical Condition and Mental Condition

Parental condition	
Parental CMC (n = 83)	
Multiple sclerosis	30.1%
Rheumatoid arthritis	12.0%
Brain damage	9.6%
Neuromuscular disease	8.4%
Spinal cord injury	7.2%
Inflammatory bowel disease	4.8%
Cerebrovascular Accidents	3.6%
Parental mental disorder (n = 24)	
Major depressive disorder	26.9%
Posttraumatic stress disorder	11.5%
Bipolar disorder	3.8%
Alcoholism	7.6%

Note. n = number of cases.

Parental mean BDI scores differed significantly between parents affected by CMC, their healthy partner and families with two healthy parents, $F(2,294) = 57.55$, $p = .01$. More specifically, parents showed higher mean depressive symptoms scores, $t(260.68) = 10.96$, $p = .00$, $d = 1.36$, and were more likely to score in the moderate–severe range of depressive symptoms, χ^2 (1, $N = 297$) = 23.82, $p < .05$, if they belonged to a family affected by parental CMC compared to a family with two healthy parents (see Table 5). Comparing the parent affected by CMC to the healthy partner, the further analysis revealed that parents with CMC were associated with a significantly higher mean BDI score compared to their healthy partners, $t(163) = –2.11$, $p = .03$, $d = 0.33$. However, the risk of parents to fall into the range of moderate–severe depressive symptoms did not differ for the parent affected by CMC (22.8%) compared to the healthy partner (13.2%), χ^2 (1, $N = 165$) = 2.05, $p > .05$. Combined, 81.3 percent of parents with CMC scored below the cut–off score indicating moderate to severe depressive symptoms, while 94.9 percent of scores for parent of families including two healthy parents were below this cut–off score (Beck et al., 1961).

Table 5

Depressive Symptoms in Parents of Families with Parental CMC and Two Healthy Parents

Parental condition	Parental CMC (n = 83)	Healthy partner (n = 83)	Two healthy parents (n = 138)
Mean depression score, BDI[1] (*SD*)	12.64 (7.88)	10.18 (6.59)	4.11 (3.94)*
Minimal depressive symptoms % (*n*)	50.6%	62.7 %	87.7 (121)**
Mild depressive symptoms % (*n*)	26.5%	22.9 %	7.2 (10)**
Moderate depressive symptoms % (*n*)	10.8%	8.4 %	0.0 (0)**
Severe depressive symptoms % (*n*)	12.0%	4.8 %	0.7 (1)**

Note. CMC = Chronic medical condition, *n* = number of cases, *SD* = standard deviation, BDI = Beck's Depression Inventory.
[1] BDI Depression scores are divided into categories ranging from 0 to 10 (minimally depressed), 11 to 17 (mildly depressed), 18 to 23 (moderately depressed), and 24 to 42 (severely depressed). *$p < .05$. All significance tests of range differences are conducted using a χ^2 – test. **$p < .01$. All significance tests of mean score differences are conducted using ANOVA.

Adolescents of parents with CMC compared to adolescents with healthy parents

Using raw scores of the YSR, adolescents of families affected by parental CMC (target group 1 total) reported significantly higher levels of internalizing problem behavior compared to adolescents of families with two healthy parents (comparison group), $t(223.96) = 2.56$, $p = .01$, $d = 0.34$ (equal variances were not assumed). Contrastingly, when T–scores were used, average scores of internalizing problem behavior did not differ between adolescents of parents with CMC and adolescents with two healthy parents, $t(239.91) = 1.87$, $p = .06$ (see Table 3). The frequencies for adolescents to score in the normal, subclinical, or clinical range of internalizing problem behavior differed significantly between this target and the comparison group, χ^2 (2, $N = 249$) = 10.68, $p < .05$. More specifically, it was confirmed that the chance of adolescents to score in the clinical and subclinical range for internalizing problem behavior was higher if they had at least one parent who suffered from CMC than two healthy parents. Further, the analysis revealed that adolescents with two healthy parents displayed significantly less anxious/depressed internalizing problem behavior than adolescents with parental CMC, regardless of using raw scores, $t(224.57) = 2.62$, $p = .01$, $d = 0.36$ (equal variances not assumed), or T–scores for the analyses, $t(247) = 2.23$, $p = .03$, $d = 0.28$. At the same time, adolescents with two healthy parents were more likely to score in the normal range of anxious/depressed internalizing problems, compared to adolescents affected by parental CMC, χ^2 (2, $N = 249$) = 6.08, $p < .05$ (see Table 3). Adolescents of parent with CMC and two healthy parents did not differ regarding mean scores and frequencies of scores falling in the clinical range of withdrawn/depressed and somatic subscales of internalizing problem behavior.

Adolescents with parental mental disorders compared to adolescents of healthy parents

The difference in mean scores of internalizing problem behavior between adolescents of parents suffering from a mental disorder (target group 2) compared to adolescents with

both parents being healthy (comparison group 2) did not yield statistical significance when T–scores were used, $t(137) = 1.51$, $p = .13$, or raw scores, $t(137) = 1.76$, $p = .08$. Nonetheless, adolescents with parents who suffered from a mental disorder showed higher risk of scoring in the clinical and subclinical range for internalizing problems compared to adolescents with both parents being healthy, χ^2 (2, $N = 139$) = 6.79, $p < .05$ (see Table 3). Also, adolescents with two healthy parents did not differ significantly on average scores of the anxious/depressed subscale when using T–scores, $t(137) = 1.75$, $p = .08$, or raw scores, $t(137) = 1.62$, $p = .11$, but were more likely to score in the normal range of anxious/depressed symptoms, χ^2 (2, $N = 139$) = 9.53, $p < .05$, compared to adolescents of parents with mental disorders. Using raw or T–scores, adolescents of parental mental disorders and two healthy parents did not differ in mean scores and frequencies of scores falling in the clinical range of withdrawn/depressed and somatic subscales of internalizing problem behavior.

Adolescents of parents with CMC compared to adolescents of parental mental disorders

Adolescents of parents with mental disorders (target group 2) did not display significantly more overall internalizing problem behavior compared to adolescents with parental CMC (target group 1) when T–scores were used for the analysis, $t(158) = -1.89$, $p = .06$. Only when raw scores were used for the analysis, adolescents of parental mental disorders showed higher internalizing mean scores compared to adolescents with parental CMC, $t(158) = -2.43$, $p = .02$, $d = 0.39$. The analysis further revealed that the risk for adolescents to fall into the clinical range of internalizing problem behavior did not differ between adolescents of parents with mental disorders and adolescents with parental CMC, χ^2 (2, $N = 160$) = 4.91, $p > .05$ (see Table 3). For the anxious/depressed subscale, scores of adolescents affected by parental mental disorders were significantly higher than those of adolescents with parental CMC when T–scores were used, $t(158) = -2.17$, $p = .03$, $d = 0.35$, and when raw scores were used for the analyses, $t(158) = -2.18$, $p = .03$, $d = 0.35$. The risk to

score in the clinical and subclinical range of anxious/depressed internalizing problem behavior was higher for adolescents of parents with mental disorders compared with adolescents of parents with CMC, χ^2 (2, N = 160) = 14.58, $p < .05$. For this comparison, adolescents affected by parental mental disorders showed significantly higher mean score on the withdrawn/depressed subscale of internalizing problem behavior compared to adolescents with parental CMC when raw scores of the YSR were used for the analyses, $t(158) = -2.37$, $p = .02$, $d = 0.38$. Mean scores and frequencies of scores falling in the clinical range on the somatic subscale of internalizing problem behavior did not differ significantly between adolescents of parental CMC or parental mental disorders regardless of using raw or T–scores.

Adolescents of parents with CMC and minimal–mild compared to moderate–severe depressive symptoms

Mean scores for adolescent problem behavior. As hypothesized, the group of adolescents of parents with CMC and moderate–severe depressive symptoms (target group 1b) was associated with a significantly larger mean score for internalizing problem behavior and anxious/depressed internalizing problem behavior compared to the group of adolescents of parents with CMC and minimal–mild depressive (target group 1a) symptoms when T–scores or raw scores were used. Results showed no significant difference between adolescents' mean scores on the withdrawn/depressed and somatic subscales of internalizing problem behavior when parents were suffering from CMC and minimal–mild depressive symptoms or moderate–severe depressive symptoms (see Table 6).

Table 6

Adolescent Problem Behavior Compared Between Parental CMC and Moderate-Severe or Minimal-Mild Depressive Symptoms

	Parental depressive symptoms								
	Minimal-mild			Moderate-severe					
	M	*SD*	*n*	*M*	*SD*	*n*	*t*	*df*	*d*
T-scores									
Total internalizing problems	48.12	11.76	104	53.45	11.99	31	-2.21*	133	0.38
Anxious/depressed	39.89	9.29	104	44.19	9.28	31	-2.26*	133	0.39
Withdrawn/depressed	36.05	6.61	104	37.93	5.21	31	-1.45	133	0.25
Somatic	37.29	6.67	104	39.19	8.58	31	-1.29	133	0.22
Raw scores									
Total internalizing problems	8.83	7.82	104	12.18	9.85	31	-1.97*	133	0.34
Anxious/depressed	4.13	4.69	104	6.16	5.97	31	-1.98*	133	0.34
Withdrawn/depressed	2.19	2.26	104	2.61	1.98	31	-.92	133	0.16
Somatic	2.70	2.59	104	3.68	3.66	31	-1.67	133	0.29

Note. *M* = Mean; *SD* = Standard deviation; *n* = number of cases; *t* = independent samples *t*-test value; *df* = degrees of freedom; *d* = Cohen's *d*. * $p < .05$. All significance tests are conducted using an independent samples *t*-test.

Mean scores on the anxious/depressed subscale were higher than mean scores on the somatic subscale of internalizing problem behaviors, not only for adolescents of parents with CMC and moderate–severe depressive symptoms, $t(60) = 3.28$, $p = .03$, $d = 0.85$, but against expectation, just as much for adolescents of parents with CMC and minimal–mild depressive symptoms, $t(206) = 2.32$, $p = .02$, $d = 0.32$ when using T–scores.

Ranges of adolescent internalizing problem behavior. The difference in the frequencies of scores falling in the clinical, subclinical or normal range was statistically significant for adolescents of parents with minimal–mild depressive symptoms for overall internalizing problem behavior scores, χ^2 (2, $N = 104$) = 96.94, $p < .05$, and scores on the anxious/depressed subscale of internalizing problem behavior, χ^2 (1, $N = 104$) = 92.35, $p < .05$ (see Table 3). Likewise, these findings apply to adolescents of parents with moderate–severe depressive symptoms, where frequencies of scores falling in the normal, subclinical or clinical range of internalizing problem behavior, χ^2 (2, $N = 31$) = 24.07, $p < .05$, and anxious/depressed internalizing problem behavior, χ^2 (1, $N = 31$) = 17.07, $p < .05$, differed

significantly. Adolescents always scored in the normal range for the withdrawn/depressed and somatic subscale of internalizing problem behavior in both parental conditions (see Table 3).

Comparing both groups, the risk for adolescents to score in the clinical range of internalizing problem behavior was higher if adolescents had parents suffering from moderate–severe depressive symptoms than parents with minimal–mild depressive symptoms. In contrast to the hypothesis, this difference in proportions of clinical scores between adolescents affected by parental CMC and moderate–severe depressive symptoms compared to minimal–mild depressive symptoms was not statistically significant, χ^2 (2, N = 135) = 1.95, $p > .05$. In order to further analyze this finding, the differences in proportions of adolescents scoring in the clinical range of the subscale of anxious/depressed were analyzed between the two groups. It was revealed that adolescents of parents with minimal–mild depressive symptoms were more likely to score in the normal range of anxious/depressed problems than adolescents of parents with moderate–severe depressive symptoms, χ^2 (2, N = 135) = 14.57, $p < .05$ (see Table 3). Further, there were more adolescents with parental moderate–severe depressive symptoms, who scored in the subclinical range of the anxious–depressed subscale of internalizing problem behavior, compared to adolescents of parents with minimal–mild depressive symptoms (see Table 3). Frequencies for withdrawn/depressed behavioral problems and somatic complaints did not differ between adolescents with parental CMC and moderate–severe depressive symptoms and minimal–mild depressive symptoms.

Adolescents of parents with CMC and moderate–severe depressive symptoms compared to adolescents of parents with mental disorders

Mean Scores for Adolescent Problem Behavior. In contrast to the hypothesized expectation, no significant difference between adolescents of parents with mental disorders (target group 2) and adolescents with parental CMC and moderate–severe depressive symptoms (target group 1b) was discovered for mean scores of internalizing problem

behavior, scores on the anxious/depressed, withdrawn/depressed, and somatic subscales of internalizing problem behavior when raw scores or T–scores were used for the analyses (see Table 7).

Table 7

Adolescent Problem Behavior Compared Between Parental CMC and Moderate-Severe or Mental Disorders

	Parental condition								
	CMC and moderate-severe depressive symptoms			Parental mental disorder					
	M	*SD*	*n*	*M*	*SD*	*n*	*t*	*df*	*d*
T-scores									
Total internalizing problems	53.45	11.99	31	54.41	13.85	25	-.23	54	0.06
Anxious/depressed	44.19	9.28	31	45.64	13.07	25	-.48	54	0.13
Withdrawn/depressed	37.93	5.21	31	38.76	7.09	25	-.44	54	0.12
Somatic	39.19	8.58	31	38.73	8.99	25	-.59	54	0.16
Raw scores									
Total internalizing problems	12.18	9.85	31	14.22	10.24	25	-.75	54	0.20
Anxious/depressed	6.16	5.97	31	7.12	6.57	25	-.57	54	0.16
Withdrawn/depressed	2.61	1.98	31	3.40	2.87	25	-1.34	54	0.36
Somatic	3.68	3.66	31	4.21	3.98	25	-.53	54	0.14

Note. *M* = Mean; *SD* = Standard deviation; *N* = number of cases; *t* = *t*-test value; *df* = degrees of freedom; *d* = Cohen's *d.* * *p* < .05. All significance tests are conducted using an independent samples *t*-test.

Moreover, adolescents of parents with moderate–severe depressive symptoms scored on average higher on the anxious/depressed scale compared to the somatic scale of internalizing problem behavior, $t(60) = 3.28$, $p = .01$, $d = 0.85$, when T–scores were used. For adolescents of parents with mental disorders the same applied, as scores were on average higher on the anxious/depressed scale than on the somatic scale of internalizing problem behavior, $t(48) = 4.91$, $p = .02$, $d = 1.42$, when T–scores were used.

Ranges of Adolescent Internalizing Problem Behavior. As described earlier, adolescents of parents with moderate–severe depressive symptoms showed significantly different proportions for scores in the normal, subclinical and clinical range of internalizing

problem behavior, χ^2 (2, N = 31) = 24.07, p < .05, and anxious/depressed symptoms of internalizing problem behavior, χ^2 (1, N = 31) = 17.07, p < .05. In line with the assumption, differences in frequencies of scores falling in the normal, subclinical or clinical range were statistically significant for adolescents of parents with mental disorders regarding overall internalizing problem behavior mean scores, χ^2 (2, N = 25) = 7.75, p < .05, and mean scores of the anxious/depressed subscale of internalizing problem behavior, χ^2 (1, N = 25) = 9.0, p < .05. All adolescents scored in the normal range of the withdrawn/depressed and somatic subscale (see Table 3). Unexpectedly, adolescents of parents with CMC and moderate to severe depressive symptoms were not more likely to fall into the clinical range of internalizing problem behavior compared to adolescents of parents with mental disorders, χ^2 (2, N = 55) = 1.60, p > .05. Still, adolescents affected by parental mental disorders were significantly more likely to show mean scores in the clinical range for anxious/depressed internalizing problems in comparison to adolescents with parental CMC and moderate to severe depressive symptoms, χ^2 (2, N = 56) = 9.53, p < .05. Frequencies for withdrawn/depressed behavioral problems and somatic complaints did not differ significantly for adolescents of parents with moderate–severe depressive symptoms and adolescents of parents with mental disorders (see Table 3).

Discussion

The current study investigated how parental CMC and depressive symptoms separately and conjointly impact adolescents internalizing problem behavior. Particularly, levels of internalizing problem behavior in adolescents with two healthy parents, parents with mental disorders, parents with CMC, and parents with CMC and depressive symptoms were compared, with the aim to, with the aim to identify adolescents at highest risk to develop internalizing problem behavior and provide targeted help to adolescents in need as early as possible. Overall, adolescents affected by parental CMC showed higher levels of total internalizing and anxious/depressed internalizing problem behavior and were more likely to

have scores in the clinical range than adolescents with two healthy parents. On average, adolescents affected by parental mental disorders did not differ in total internalizing and anxious/depressed problem behavior levels compared to adolescents with two healthy parents. However, they were more likely to score in the clinical range of internalizing and anxious/depressed problem behavior compared to adolescents with two healthy parents. Results revealed that adolescents with parental CMC and additional moderate–severe depressive symptoms showed the most adverse outcomes, with high average scores of internalizing and anxious/depressed problem behavior. In addition, they scored most frequently in the clinical range of anxious/depressed internalizing problem behavior compared to adolescents with parental CMC and minimal–mild depressive symptoms or parental mental disorders.

The results of this study were only partly in line with the hypothesized outcomes. In accordance with previous literature (Barkmann et al., 2007) and in confirmation with the first hypothesis, adolescents affected by parental CMC displayed more internalizing and anxious/depressed problem behavior compared to adolescents of the corresponding control group including families with two healthy parents when raw scores were used. When T–scores were used for the analysis, mean scores of adolescents with parental CMC and two healthy parents did not differ for total internalizing problem behavior, only for the anxious/depressed subscale. Further, adolescents of parents with CMC were more likely to score in the clinical range of internalizing and anxious/depressed problem behavior compared to the associated control group, accrediting previous findings (Sieh et al., 2010).

The critical discrepancy between using T–scores as opposed to raw scores in statistical analyses was highlighted by the present findings. In their manual for the new version of YSR scales, Achenbach and Rescorla (2001) suggest that raw scores should be used in statistical analyses. By this, the full range of variation in scores on subscales can be taken into account. In contrast to raw scores, the elimination of lower scores of the distribution in the process of

transforming raw scores into T–scores reduces the range of variation in these scales. Correspondingly, research of Thurber and Sheehan (2012) pointed to the importance of using raw scores for data analyses, as effects revealed by the analyses may otherwise be overseen. For the present study, analyses were more sensitive in detecting effects in differences of internalizing problem behavior mean scores between adolescents with parental CMC and two healthy parents when raw scores were used. Using T–scores, the independent samples *t*-test comparing adolescents mean internalizing problem behavior scores between parental CMC and two healthy parents did not reach statistical significance. For exploratory purposes and to demonstrate the discrepancy of using raw and T-scores, analyses of the present study used both.

Contradicting previous findings (Goodman & Gotlib, 2002) and the second hypothesis, adolescents with parental mental disorders did not show higher levels or higher frequencies of scores falling in the clinical range of internalizing and anxious/depressed problem behavior compared to adolescents with two healthy parents, regardless whether using raw scores or T–scores for the analyses. Taking the age of the participants into account, it should be noted that in contrast to previous research which mainly focused on adolescents, this present study included adolescents affected by parental mental disorders with a mean age of 18 years. Compared to families with older adolescents, families with younger children were considered to adapt and respond differently to parental CMC (Korneluk & Lee, 1998). By older age, adolescents may naturally be more emotionally disconnected from parents and may have developed more adaptive skills that help to cope with the parental condition and protect against the development of internalizing problem behavior (Abrams, 2015). In addition, younger children may rely more on parental support and could be more vulnerable to changes in family structures due to parental conditions (Möller et al., 2014). Therefore, parental mental disorders may have higher impact on internalizing problem behavior of children, but may show less influence on adolescents of older age. Also, these inconsistent findings could

be explained by methodological flaws. Twenty–five adolescents affected by parental mental disorder were compared to 114 adolescents of two healthy parents. This discrepancy in sample size could have lead to inadequate statistical power (Fritz, Cox, & MacKinnon, 2015), meaning that effects and differences between groups were harder or impossible to detect. Likewise, using a heterogeneous sample of 25 adolescents with parents affected not only by mental conditions, but chronic medical conditions as well could have resulted in reduced power of the statistical analyses. Nevertheless, adolescents with parental mental disorders were more likely to score in the clinical range of internalizing and anxious/depressed problem behavior than adolescents with two healthy parents, accrediting research conducted by Trapolini, McMahon, and Ungerer (2007).

Adolescents of families with parental mental disorders showed higher levels of internalizing and anxious/depressed problem behavior compared to adolescents with parental CMC when raw scores were used for the analyses. Using T–scores, mean scores between adolescents of parental CMC and parental mental disorders did not differ for total internalizing problem behavior, only for scores on the anxious/depressed subscale. Likewise, the risk for adolescents to score in the clinical range was higher when parents were suffering from mental disorders than from CMC, but only for the anxious/depressed subscale of internalizing problem behavior and not for total internalizing problems. These results could be explained by the findings of Goodman, Adamson and Riniti (1994) that mothers with a history of mental disorders displayed heightened negative and reduced positive emotionality, as well as more critical attitudes toward the child. Reduced emotional affect and heightened negative emotionality may be transmitted to the child, leaving the child at greater risk for emotional insecurity, depressive and anxious symptoms and increased internalizing problem behavior, while the critical attitude of the parent negatively influences the self–esteem of the child (Perils et al., 2005). Again, discrepancies between using raw scores or T–scores for the analyses should be considered.

In congruence with findings by Sieh et al. (2010) and the fourth hypothesis, adolescents with parents that suffered from CMC and additional moderate–severe depressive symptoms showed larger average levels of total internalizing problem behavior, and displayed more anxious/depressed symptoms compared to adolescents of parents with CMC and additional minimal–mild depressive symptoms. Contradictory to our hypothesis and previous findings (Essex, Klein, Miech, & Smider, 2001; Sieh et al., 2010), even though adolescents with parental CMC and moderate–severe depressive symptoms were more likely than adolescents of parents with CMC and minimal–mild depressive symptoms to score in the clinical range with regards to anxious/depressed symptoms, but surprisingly this was not the case for overall internalizing problem behavior. Additionally, both groups of parents with minimal–mild and moderate–severe depressive symptoms showed more anxious/depressed than somatic symptoms of internalizing problem behavior.

As research expected, parental depressive symptoms appeared to be a major risk factor for adolescents to develop internalizing problem behavior (Goodman & Gotlib, 1999). During childhood, maternal depression has been associated with disorders in attachment, due to emotional instability and unavailability of the ill parent (Essex et al., 2001). Such insecure attachments of adolescents may lead to vulnerability and heightened levels of distress in social situations, increasing their likelihood to show internalizing problem behavior in the form of anxious and depressive symptoms and social withdrawal (Goodman, & Gotlib, 1999). In the present study, total internalizing problem behavior did not seem to be affected by parental depressive symptoms. However, it should be noted that the present study compared 104 adolescents with parental CMC and minimal–mild depressive symptoms to 31 adolescents of parents with CMC moderate–severe depressive symptoms. This difference in sample size could explain the non–finding of an effect of parental depressive symptoms on adolescent internalizing problem behavior, as the power of the test to compare both groups may have been too low.

Furthermore, overall internalizing problem behavior comprised scores for the subscale of somatic symptoms. Thus, differences between adolescents of parents affected by moderate–severe depressive symptoms and minimal–mild depressive symptoms may not be detected on the level of total internalizing problem behavior, as this score may be masked by low scores on the somatic complaints subscale. Parental moderate–severe depressive symptoms seemed to increase anxious/depressed symptoms of internalizing problem behavior (Sieh et al., 2012), while parental minimal–mild depressive symptoms did not show such an influence. Comparing both samples, a difference on the surface of internalizing problem behavior may not be noticeable, as the combined score of all subscales may mask individual effects. By analyzing mean scores for the subscale of anxious/depressed behavior seperately, the differences in mean scores between adolescents with parental CMC and minimal–mild depressive symptoms and moderate–severe depressive symptoms become now apparent.

Disclaiming the hypothesis, adolescents with parental CMC and moderate–severe depressive symptoms did not show higher average scores of internalizing problem behavior and anxious/depressed symptoms compared to adolescents with parental mental disorders, no matter whether using raw scores or T–scores. As adolescents affected by parental CMC and moderate–severe depressive symptoms or parental mental disorders are both exposed to parental emotional unavailability, adolescents may be exposed to a comparable severity of parental depressive symptoms. Armistead et al (1995) indicated that the functioning of adolescents of parents with CMC is not significantly different compared to those affected by parental mental disorders in terms of psychological symptoms and self–esteem. As before, adolescents with parental CMC and moderate–severe depressive symptoms were more likely to score in the clinical range for anxious/depressed, but not for total internalizing problem behavior, compared to adolescents with parental mental disorders.

Several potential limitations need to be noted and may have influenced the results of this present investigation. First of all, self–report measures for internalizing problem behavior

of adolescents (YSR) were used. Discrepancies between child and parent reports are likely to occur, with children being more likely to report higher levels of internalizing problem behavior compared to their parents (Achenbach, 2013). A possible explanation could be that children of parents with CMC may conceal their own problems from their parents with the aim of sparing them further distress. Hence, exclusive use of child report of internalizing problem behavior could influence results due to biased reporting (Briggs–Gowan, Carter, & Schwab–Stone, 1996). Furthermore, this study did not differentiate between parents merely affected by mental disorders and parents affected by mental disorders and comorbid medical conditions, such as CMC. This may have caused biased findings in form of an underestimation or overestimation of possible effects of parental mental disorders. Likewise, the family cluster effect should be taken into account, as more than one adolescent of the same family was allowed to participate in this study. Brothers and sisters within the same family may be statistically dependent on each other, due to interconnectedness of genetic predispositions and family environmental factors. This could have influenced and explained the effect of parental CMC on child internalizing problem behavior (Bosker & Snijders, 1990). For adolescents with parental mental disorders, five items of the somatic scale were missing and substituted by using mean scores of the remaining available items, leading to low reliability of this somatic subscale. Unreliability of measures may increase the risk of underestimating true relationships among variables and effects. Concerning external validity, this study manifests high selectivity, limiting generalizability of findings. Participants of this study were mostly Dutch, highly educated with rather high income of parents, which is why findings may not be generalizable to individuals coming from different cultural, educational and socioeconomic backgrounds. Also the sample including families affected by parental CMC was recruited all over the Netherlands, and adolescents were younger in contrast to the sample including families with mental disorders, which was sampled only in Leiden. As a result, comparisons of measures between both groups may be invalid and biased.

For a conceptual replication of this study, demographic differences between comparison groups should be controlled for. As examples, the sample size, age, educational background and gender should be more consistent among groups of adolescents in order to assure homogeneity between the groups and to draw more reliable conclusions. Moreover, attributes of the parental medical condition like severity, type, course and possible comorbid conditions should be taken into account, as they determine adolescent functioning (Armistead et al., 1995; Rolland, 1990) and may moderate the relationship between parental depressive symptoms and child problem behavior. Especially illness duration was reported to impact child problem behavior, as the longer duration of a parental illness was associated with the depletion of resources for coping with parental conditions, leading to increased levels of stress and internalizing problem behavior (Armistead et al., 1995). The statistical dependency of scores of adolescents from the same family may need to be controlled for in future investigations in order to draw more valid conclusions from statistical analyses regarding the effect of parental CMC and depressive symptoms on adolescent internalizing problem behavior. An investigation using the combined reports from adolescents, parents, teachers, and other important caregivers may be most representative of the actual severity of internalizing problem behavior. Further, future research could extend the present study by investigating moderating effects of additional risk and protective factors, as they may be relevant for clinical practice and were not interrogated in this study (e. g., coping mechanisms, attachment, perceives stress of adolescents). Therefore, we suggest that future studies investigate the effect of parental attachment and perceived stress of the adolescent in order to identify possible mediating or moderating factors in the relationship between parental CMC, depressive symptoms and adolescent internalizing problem behavior.

The presence of parental depressive symptoms in addition to parental CMC reflects an important risk factor associated with adolescent internalizing problem behavior. Early internalizing problem behavior patterns can lead to an increased likelihood of developing

mental health problems (Trapolini et al., 2007). This is why it is important to consider parental depression and CMC combined as a high risk factor for various health problems of adolescents and offer targeted prevention actions and professional help for these children at high risk as early as possible (Sieh et al., 2010; Spence, Najman, Bor, O'Callaghan, & Williams, 2002). Therefore, regular screenings should be applied to allow early identification of those children at particular risk. By this means, professional assistance and external support could be provided to children identified to be at risk in order to prevent developmental and persisting problematic behavior, for example by including them in therapeutic processes when parents are diagnosed with CMC and increased depressive symptoms.

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