



Examining Longitudinal Relations Between Mothers' and Fathers' Parenting Stress, Parenting Behaviors, and Adolescents' Behavior Problems

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Abstract

Parenting stress of mothers has frequently been linked to negative child outcomes. According to Abidin's stress model, this relationship may be explained by dysfunctional parenting behaviors. In this study, we scrutinized the effects of both mothers and fathers in the pathway from parenting stress through parenting behaviors to subsequent adolescent behavior problems. We expected the association between parenting stress and adolescent behavior problems to be partially mediated by maternal and paternal parenting behaviors. Further, we expected crossover effects, i.e., that parenting stress of one parent was related to the parenting behavior of the other parent. We applied a 3-wave longitudinal design using data from 441 adolescents (52% girls) and their parents (419 fathers; 436 mothers). Parents reported on parenting stress (adolescent age range = 10.9–16.3 years). Adolescents reported on perceived parental overreactivity and warmth (age range = 12.9–18.3) and their own internalizing and externalizing problems (age range = 15.9–21.3). Despite cross-sectional significant associations between parenting stress, parenting behavior, and adolescent behavior problems, we found no evidence of longitudinal linkages. One exception was maternal parenting stress, which positively predicted later adolescent externalizing problems. Consequently, the mediating role of parenting behaviors was not supported. We found no crossover effects in the pathway from parenting stress to parenting behaviors. The discrepancies between our longitudinal and cross-sectional findings raise questions about the actual impact that parents have on their children's outcome. Though, targeting mothers' parenting stress may help to reduce adolescent externalizing problems and its ramifications at least to some extent.

Keywords Parenting stress · Parenting behaviors · Adolescents · Behavior problems · Family processes

Highlights

- This study tested Abidin's stress model from a family systems perspective, using 3-wave longitudinal data from mothers, fathers, and adolescents.
- Clear cross-sectional but few longitudinal linkages were found between parenting stress, parenting behavior, and adolescent behavior problems.
- Only maternal parenting stress was related to later adolescent externalizing problems, but not to internalizing problems nor parenting behaviors.

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- These nuanced findings raise questions about the actual impact that parents have on their children's outcomes.
- We recommend further longitudinal research to unravel any bidirectional influences between mothers, fathers, and adolescents.

Although parenting is rewarding for most mothers and fathers (Umberson et al. 2010), parenting a child also presents various challenges, potentially leading to the experience of stress. Parenting stress refers to the negative feelings related to the self and to the child directly attributable to the demands of parenthood. This type of stress is experienced by parents from all sociodemographic groups and in many contexts. Parenting stress is conceptually distinct from other forms of stress a parent might experience such as financial hardship, work stress, or negative life events, as it directly relates to the everyday tasks of parenting (e.g., managing complicated schedules, arranging childcare; Crnic and Low 2002). Nevertheless, more general or other life stressors may contribute to parenting stress. For instance, financial hardship may cause parents to worry about their ability to care for their children and arouse feelings of insecurity or stress about their parenting role (Cassells and Evans 2017). As it is *closer* to raising a child, parenting stress has been suggested to have a greater influence on both parenting and child development than other types of stress (e.g., Holly et al. 2019). In fact, previous studies consistently point to concurrent links between parenting stress, parenting behaviors, and child problem behavior (e.g., Anthony et al. 2005; Rodriguez 2011), also when other life stressors are controlled for (Costa et al. 2006). Yet, the longitudinal effects of parenting stress on adolescent behavior are hardly investigated, impeding any conclusion on directions of effects. Moreover, as most studies on parenting stress focus on mothers (e.g., Crnic et al. 2005; Huth-Bocks and Hughes 2008), little is known about the role of fathers' parenting stress in offspring outcomes, while evidence clearly indicates that fathers affect children's development (Sarkadi et al. 2008). Although it is likely that mother's and father's parenting stress may affect their partner's parenting behaviors, the scarcity of research on fathers limits our knowledge on such potential *crossover* effects. Therefore, we examined the associations of mother's and father's parenting stress with their own and partner's parenting behaviors, and with subsequent adolescent behavior problems. With this design, we build upon existing work by focusing on the impact of parenting stress on adolescents' behaviors, by testing individual and crossover effects of both parents, and by applying a longitudinal multi-informant design.

Research on the effects of parenting stress on offspring outcomes has mostly been based on Abidin's (1992) stress model. This model postulates that dysfunctional parenting behaviors mediate the relationship between parenting stress and negative child outcomes. Similarly, the Family Stress

Model (Conger et al. 2010) suggests that economic stress influences parental emotional distress, marital instability, and dysfunctional parenting, which, in turn, lead to adolescent maladjustment. A considerable amount of research has examined the individual parts of Abidin's model on parenting stress. These studies point to associations between increased parenting stress and more negative (e.g., over-reactivity, laxness, physical punishment; Deater-Deckard and Scarr 1996; Prinzie et al. 2007; Reitman et al. 2001) or less positive parenting behaviors (e.g., less nurturance, less acceptance; Anthony et al. 2005; Putnick et al. 2008). Additionally, both parenting stress and dysfunctional parenting behaviors have been linked to poor child outcomes, such as internalizing and externalizing problems (e.g., Anthony et al. 2005; Crnic et al. 2005; Healy et al. 2015).

Despite these bivariate associations, surprisingly few studies have empirically tested the hypothesis that parenting behaviors mediate the relationship between parenting stress and offspring behavior problems. To the best of our knowledge, only one study offered some evidence by showing that authoritarian parenting (i.e., high physical punishment, low reasoning) partially mediated the association between parenting stress and behavior problems among preschool aged children (Deater-Deckard and Scarr 1996). Other studies did not support a mediating effect of parenting in the association between parenting stress and child behavior problems (Anthony et al. 2005; Cabrera and Mitchell 2009; Crnic et al. 2005; Huth-Bocks and Hughes 2008; Mackler et al. 2015). Thus, empirical evidence for Abidin's stress model is mixed.

However, most previous studies testing Abidin's model employed cross-sectional research designs and, hence, the effects of parenting stress over time could not be determined. It may be that children who engage with stressed parents show negative developmental outcomes as they grow older, as the cumulative impact of parental stress and behavior on children's functioning might become salient over time. Additionally, due to the cross-sectional nature of earlier studies, the temporal order of effects remains unclear. While it is assumed that parenting stress influences children's behaviors, a cross-sectional association might also reflect an effect in the opposite direction. That is, difficult child behavior may increase parenting stress and elicit negative parenting behaviors. In line with this notion, some cross-lagged findings indicate that parenting stress, parenting behaviors, and maladaptive child behaviors may influence each other bidirectionally during the period of middle childhood (Mackler et al. 2015; Neece et al. 2012;

Stone et al. 2016). These results raise questions about the unidirectionality of effects suggested by Abidin's model. In order to increase knowledge about the direction of effects, it is important to conduct longitudinal research that accounts for the dynamic nature of parent and child behaviors over time. Unfortunately, the aforementioned cross-lagged models on parenting stress and child adjustment (Mackler et al. 2015; Stone et al. 2016) exclusively focused on mothers. When fathers were included in research, mothers and fathers were not included simultaneously in one model (Neece et al. 2012). Also most other studies have solely addressed maternal parenting stress (e.g., Crnic et al. 2005; Huth-Bocks and Hughes 2008), whereas evidence suggests that fathers experience comparable levels of parenting stress as mothers and their stress might affect child behavior in a similar way as maternal parenting stress does (Deater-Deckard, and Scarr 1996). According to the fathering vulnerability hypothesis (Cummings et al. 2004), the strength of the link between stress and parenting may differ between mothers and fathers: Fathering would be more vulnerable to stress than mothering, possibly because the roles of fathers as parents and child caretakers are less clearly defined (Belsky et al. 1991; Cummings et al. 2010). Nevertheless, the few empirical studies testing father-mother differences in the link between stress and parenting behavior provided mixed support for the fathering vulnerability hypothesis (e.g., Barnett et al. 2008; Ponnet, Mortelmans et al. 2013; Ponnet, Wouters et al. 2013). It might be that ambiguity about the roles of fathers does not necessarily cause more stress and more negative parenting behaviors, but rather results in more flexible and adaptable ways of parenting by fathers compared to mothers. Because fathers are nowadays expected to be an equal coparent with mothers (Crnic et al. 2009; Pleck 2010), it is important to examine the degree to which the pathways from parenting stress to parenting behaviors are similar for mothers and fathers.

Furthermore, including both mothers and fathers in research on parenting stress makes it possible to take into account the interdependency of individual family members as described by the family systems theory (Cox and Paley 1997; Minuchin 1974). One of the processes in which parents are hypothesized to influence each other is crossover (Erel and Burman 1995), for instance, when the parenting stress of one parent affects the parenting behavior of the other parent. There is some support for crossover effects in the context of parenting. For example, studies demonstrated that perceptions of family stress (Nelson et al. 2009) and marital satisfaction (Ponnet, Mortelmans, et al. 2013) of one parent were related to the parenting behaviors of the other parent. Although the latter study did not find any crossover effects from parenting stress to parenting behaviors (Ponnet, Mortelmans et al. 2013), this might be related to the measurement of parenting stress.

That is, parenting stress in this study was assessed by seven items mainly reflecting role-restriction due to having a child, whereas parenting stress is often seen as a complex process related to multiple domains, namely: the task demands of parenting (e.g., sense of parenting competence), the parent's psychological well-being and behavior in relation to the child (e.g., negative feelings towards the child), and the qualities of the parent-child relationship (e.g., attachment relationship; Deater-Deckard 1998). Remarkably, studies examining individual and crossover effects of parenting stress on parenting behaviors of mothers and fathers and subsequently adolescent behavior are lacking. It is important to investigate these mechanisms, as insight into the interdependency of parents in the context of parenting may be valuable for the design of effective parenting interventions.

Moreover, much research has focused on parenting stress in the transition to parenthood and during the early years of a child's life (e.g., Crnic et al. 2005; Mackler et al. 2015; Neece et al. 2012), but less is known about the impact of parenting stress on the functioning of parents and offspring in adolescence. Relationships between parents and adolescents differ from relationships between parents and younger children, e.g., in that parents and adolescents interact less frequently and tend to have more conflicts (Smetana et al. 2006). In addition, other research has indicated that parent-adolescent relationships are marked by increasing interdependence and mutuality (Lamb and Lewis 2010). Regarding the role of fathers, some evidence suggests the influence of fathers' sensitivity on child adjustment might be larger in adolescence than earlier in childhood (Grossmann et al. 2002). These changes in parent-child relationships and dynamics might affect associations of mothers' and fathers' parenting stress and parenting behaviors with adolescent behavior problems. Moreover, as the period of adolescence is marked by an increase in externalizing (e.g., hostility and delinquency) and internalizing (e.g., depressed mood and anxiety) problems (Kessler et al. 2005), it is important to understand what factors put adolescents at risk for behavior problems. Although previous findings suggest that parenting stress exerts its effects on adolescent self-concept indirectly through perceived parenting behavior (Putnick et al. 2008), the mechanism linking parenting stress to adolescent *behavior problems* has not yet been investigated.

To expand previous work, the first aim of our study was to examine the lagged associations between parenting stress, parenting behaviors, and adolescent problem behavior over a 5-year period. We adjusted for the stability of adolescent problem behavior and parenting behaviors over time, to test whether parenting stress predicted change in parenting behaviors, and whether parenting behaviors, in turn, predicted change in adolescent behavior problems across adolescence. As several studies suggest that adolescent perceptions of parenting may be more important than

actual parenting practices for adolescent behavioral outcomes (e.g., Hoeve et al. 2009; Van Lissa et al. 2019), we focused on adolescents' perception of parenting behaviors. Based on the reviewed literature, we expected greater parenting stress in fathers and mothers to be directly associated with higher levels of adolescent behavior problems. Furthermore, we hypothesized this association to be partially mediated by more negative and less positive parenting behaviors of fathers and mothers. We examined whether the proposed mediation mechanism was equal across boys and girls in an exploratory way, as previous studies comparing parental effects for boys and girls provided inconsistent results (e.g., Leaper 2002).

Our second aim was to examine mother-father differences and crossover effects between mothers and fathers in the pathways from parenting stress to parenting behaviors. We exploratively investigated mother-father differences in the strength of the link between parenting stress and parenting behaviors, due to mixed support for the fathering vulnerability hypothesis provided by earlier studies. Finally, we expected crossover to occur, i.e., that higher levels of parenting stress experienced by one parent were related to more negative and less positive parenting behaviors of the other parent.

Method

Participants

This study is part of the ongoing Flemish Study on Parenting, Personality, and Development. We used data from the fifth (T1; 2007), sixth (T2; 2009) and seventh (T3; 2012) measurement waves, as these waves comprised the period of adolescence and contained the measures of interest. At T1, a total of 462 (67.7% retention rate over 8 years) families still participated. Families were included in the current study when at least one parental report on parenting stress (T1) and adolescent report on parenting behaviors (T2) or adolescent report on adolescent behavior problems (T3) was available. As 21 families dropped out completely after T1, a sample of 441 families was available. Of these families, 5 had missing data on maternal parenting stress, 22 on paternal parenting stress, 27 on maternal parenting behaviors, 31 on paternal parenting behaviors, and 38 on adolescent behavior problems. Consequently, 436 mothers and 419 fathers were eligible at T1, 414 mothers and 410 fathers were eligible at T2, and 403 adolescents were eligible at T3. Families in the final sample did not differ from families that dropped out after T1 regarding parenting stress of mothers ($t(455) = -0.66, p = 0.509$) or fathers ($t(436) = 0.11, p = 0.915$), educational attainment of parents ($\chi^2(5) = 10.54, p = 0.061$), marital status of

parents ($\chi^2(1) = 2.96, p = 0.085$), adolescent gender ($p = 0.589$, Fisher's Exact Test), adolescent age ($t(459) = -0.33, p = 0.741$), or adolescent behavior problems at baseline ($t(451) = 0.34, p = 0.736$).

The final sample of 441 families consisted of 210 boys (47.6%) and 231 girls (52.4%) and their parents. On average, adolescents were 13 years and 10 months old at T1 ($SD_{T1} = 1.1$ years; $range = 10.9$ – 16.3 years), 15 years and 10 months old at T2, ($SD_{T2} = 1.1$), and 18 years and 10 months old at T3 ($SD_{T3} = 1.1$). At T1, mothers were on average 42.9 years old ($SD = 3.5$ years, $range = 33.1$ – 57.9 years) and fathers were 44.9 years old ($SD = 4.2$ years, $range = 34.7$ – 66.7 years). Parents were of Belgian nationality, mostly (91.4%) concerning two-parent households (living together or married). Number of children in the family ranged from 1 to 7 ($M = 2.4$). Highest educational levels achieved for mothers and fathers were 0.6% and 2.6% for elementary school, 34.4% and 42.1% for secondary school, 50.0% and 34.4% for nonuniversity higher education ("college"), and 15.0% and 21.0% for university or higher, respectively.

Procedure

In 1999, a proportional stratified sample of elementary-school-aged children and their families in Belgium was randomly selected. Strata were constructed according to geographical location (province), children's age, and sex. Parents of 682 (85.3% response rate) children agreed to participate in the study. Informed consent was obtained from all individual participants included in the study. The board of the Katholieke Universiteit Leuven approved all procedures (for a detailed description of recruitment and sample characteristics, see Prinzie et al. 2003).

Measures

Parenting stress

At T1, mothers ($\alpha = 0.93$) and fathers ($\alpha = 0.94$) reported the amount of stress they experienced related to having a child, using the Dutch version of the Parenting Stress Index (PSI; Abidin 1995; De Brock et al. 1992). This domain consists of 58 items and seven subscales: Sense of Competence (e.g., "I feel that I am not very good at being a parent"), Role Restriction (e.g., "Since I have this child, I have not been able to do other, new things"), Attachment (e.g., "I often do not understand my child"), Depression (e.g., "I often feel like giving up"), Health (e.g., "Since I have children, I am more tired than before"), Social isolation (e.g., "I feel alone and without any friends"), and Marital Relationship (e.g., "Having a child has caused more problems than I expected in my relationship with my spouse"). Answers are given on a 6-point

scale (1 = *totally disagree* to 6 = *totally agree*). Correlations between the subscales ranged from 0.43–0.81 ($ps < 0.001$) for mothers and 0.46–0.82 ($ps < 0.001$) for fathers. A total score for overall parenting stress was computed by calculating the mean of the item scores, with higher scores implying more parenting stress.

Overreactivity

At T1 and T2, adolescents reported on their mothers' ($\alpha_{T1} = 0.80$; $\alpha_{T2} = 0.82$) and fathers' ($\alpha_{T1} = 0.82$; $\alpha_{T2} = 0.85$) overreactive discipline, as a representation of negative parenting behavior, using the Parenting Scale (Arnold et al. 1993; Prinzie et al. 2007). The nine items tapping overreactivity measure parents' tendency to respond impatiently, aversively, or with anger, meanness, and irritation to their children's problematic behavior. Items describe discipline encounters (e.g., "When I misbehave...") followed by two options that act as opposite anchor points for a 7-point scale, on which 1 indicates a high probability of using a more positive discipline strategy (e.g., "My mother speaks to me calmly") and 7 indicates a high probability of using a more negative, i.e., overreactive, discipline strategy ("My mother raises her voice or yells").

Warmth

At T1 and T2, adolescents rated their mothers' ($\alpha_{T1} = 0.88$; $\alpha_{T2} = 0.91$) and fathers' ($\alpha_{T1} = 0.91$; $\alpha_{T2} = 0.92$) warmth, as a representation of positive parenting behavior, using the warmth/involvement scale of the Parenting Practices Questionnaire (Robinson et al. 1995). This scale, consisting of eleven items, assesses the extent to which parents exhibit warm parenting and are involved in their children's lives (e.g., "My mother shows empathy when I am hurt or frustrated"). Answers are given on a 5-point scale (1 = *never* to 5 = *always*).

Behavior problems

To measure adolescent internalizing (α range = 0.88–0.89) and externalizing (α range = 0.81–0.85) behavior problems, adolescents filled out the Dutch version of the Youth Self Report (YSR; Achenbach 1991; Verhulst et al. 1996) at T1, T2, and T3. The items assessing internalizing (31 items) and externalizing (32 items) behaviors were answered on a 3-point scale (0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*). Internalizing and externalizing problem scores were computed by calculating the mean of the scores on the relevant items multiplied by the number of items, to correct for any potential missing items.

Covariates

As prior research indicates that child age, family size, marital status, and parental education are associated with parenting stress, parenting behaviors, and child functioning (e.g., Belsky and Jaffee 2006; Conger et al. 2010; Neece et al. 2012), we included these demographic characteristics as covariates in the analyses. At T1, parents were asked to report on their children's date of birth, marital status (*living together, separated*), family size, and highest level of educational attainment (*elementary school, secondary school, nonuniversity higher education, university or higher*). We took the level of the parent with the highest level of educational attainment as our measure of educational attainment.

Data Analyses

First, descriptive statistics and correlations between the study variables were examined. Next, we tested a longitudinal mediation model using path analyses in Mplus 7.4 (Muthén and Muthén 1998–2012) to examine whether parenting stress was both directly and indirectly, via parenting behaviors, related to adolescent problem behavior. As advised by Maxwell and Cole (2007), we tested Abidin's (1992) mediation model using an autoregressive model of change, by including fully lagged assessments of change in the mediator (parenting behaviors) and outcome (adolescent behavior problems) in the model. That is, we included parenting behaviors at T1 and T2, as well as adolescent behavior problems at T1, T2, and T3, in order to examine whether parenting stress at T1 predicted change in parenting behaviors over time, and whether parenting behaviors at T2, in turn, predicted change in adolescent behavior problems over time (see Fig. 1). Adolescent age, family size, marital status, and parental education were included in the analyses as covariates.

As recommended for testing indirect effects in mediation models, we used bias-corrected bootstrap intervals (using 1,000 bootstrap samples) to account for non-normality in the data (Preacher and Hayes 2008). This way, point estimates and 95% confidence intervals (CI) were estimated for the direct and indirect effects. As missing data were missing completely at random (Little's MCAR test; $\chi^2(127) = 150.87$, $p = 0.073$), cases with missing data were included in the analyses by using the full information maximum likelihood approach (Muthén and Muthén 1998–2012). To evaluate model fit, we used the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Model fit was considered to be good if $CFI \geq 0.95$, $RMSEA < 0.08$, and $SRMR < 0.05$ (Byrne 2013).

We tested whether the links between parenting stress and parenting behaviors differed between fathers and

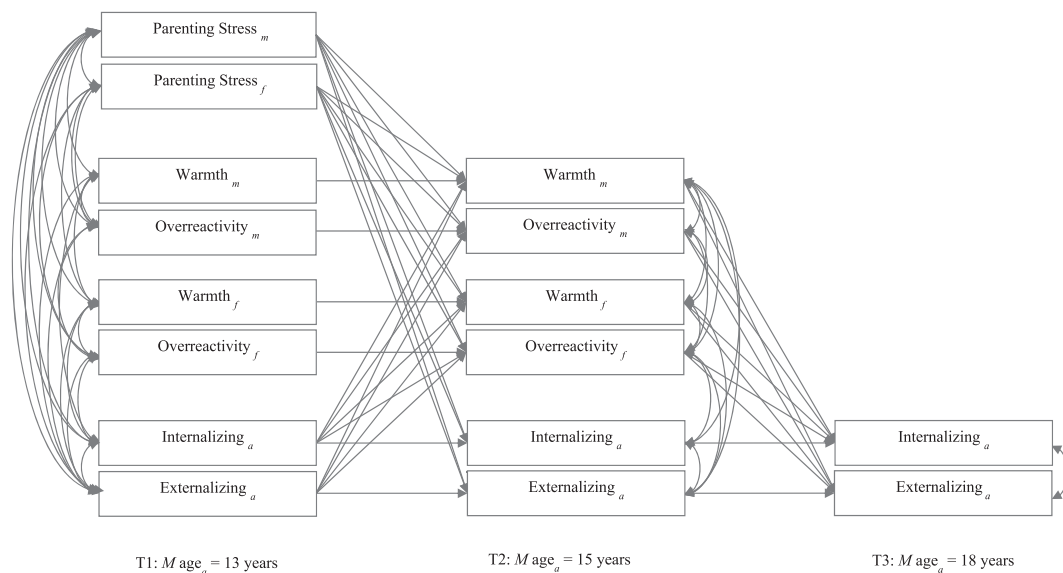


Fig. 1 Conceptual Mediation Model Including Parenting Stress, Parenting Behavior, and Adolescent Problem Behavior. *m* mother; *f* father; *a* adolescent

mothers by specifying equality constraints. Models in which the hypothesized regression paths were freely estimated across parents were compared to models in which these paths were constrained to be equal across parents. If this omnibus test indicated a better fit for the unconstrained model, equality constraints were imposed for each regression path. In contrast, a nonsignificant difference in fit between these models would indicate the associations are similar for fathers and mothers. To compare the models, we used the sample size-insensitive ΔCFI in addition to $\Delta\chi^2$. Two conditions should be met to indicate a better model fit for the unconstrained model: a significant $\Delta\chi^2$ (with $p < 0.05$) and a $\Delta\text{CFI} \geq 0.01$ (Chen 2007). To test whether the hypothesized regression paths between all variables were similar for boys and girls, we performed multiple group analyses and compared the unconstrained and constrained models in a similar way.

Results

Descriptive Statistics

Means and standard deviations of the study variables are shown in Table 1. Correlations between the study variables are presented in Table 2. The correlation between maternal and paternal parenting stress at age 13 (T1) was moderate ($r = 0.44$). Correlations between adolescent-reported maternal and paternal parenting at age 15 (T2) were moderate for overreactivity ($r_{T1} = 0.34$; $r_{T2} = 0.28$) and strong for warmth ($r_{T1} = 0.57$; $r_{T2} = 0.50$). Higher levels of parenting stress at age 13 were related to more adolescent-reported overreactive

Table 1 Means, Standard Deviations, and Results of Paired Samples *T*-test

	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	Mothers		Fathers	
Parenting Stress T1	1.96	0.62	1.86**	0.61
Overreactivity T1	3.25	1.02	3.34	1.13
Warmth T1	3.61	0.72	3.06***	0.83
Overreactivity T2	3.38	1.03	3.53*	1.16
Warmth T2	3.45	0.73	2.84***	0.81
	Girls		Boys	
Internalizing T1	11.41	8.01	9.45**	7.12
Externalizing T1	8.64	5.48	9.35	6.21
Internalizing T2	11.83	8.03	9.04***	7.08
Externalizing T2	9.52	6.01	10.97*	6.99
Internalizing T3	12.89	8.15	10.24**	8.54
Externalizing T3	8.15	5.16	9.93**	6.27

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

parenting ($r_{\text{maternal}} = 0.23$; $r_{\text{paternal}} = 0.21$) and less warmth ($r_{\text{maternal}} = -0.16$; $r_{\text{paternal}} = -0.20$) at age 15, and to more adolescent internalizing ($r_{\text{maternal}} = 0.17$; $r_{\text{paternal}} = 0.11$) and externalizing behavior ($r_{\text{maternal}} = 0.21$; $r_{\text{paternal}} = 0.13$) at age 18 (T3). Cross-parent correlations showed that greater maternal parenting stress at age 13 was related to higher levels of perceived paternal overreactive parenting ($r = 0.21$) and lower levels of paternal warmth ($r = -0.16$) at age 15. Likewise, greater paternal parenting stress was related to higher levels of maternal overreactivity ($r = 0.14$) and to lower levels of maternal warmth ($r = -0.12$) 2 years later.

Table 2 Spearman Correlations between Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Parenting stress _m , T1	-															
2. Parenting stress _f , T1	0.44*	-														
3. Overreactivity _m , T1	0.24***	0.15**	-													
4. Overreactivity _f , T1	0.20***	0.34***	-													
5. Warmth _m , T1	-0.22**	-0.15**	-0.33***	-												
6. Warmth _f , T1	-0.17***	-0.18***	-0.21***	-0.39***	-											
7. Overreactivity _m , T2	0.23***	0.14**	0.57***	-0.27***	-0.09***	-										
8. Overreactivity _f , T2	0.21***	0.21***	0.23***	0.58***	-0.13**	-0.29***	0.28***	-								
9. Warmth _m , T2	-0.16**	-0.12*	-0.26***	-0.19**	0.56***	0.29***	-0.32**	-0.18***	-							
10. Warmth _f , T2	-0.16**	-0.20***	-0.15**	-0.31***	0.30***	0.55***	-0.12*	-0.38***	0.50***	-						
11. Internalizing _m , T1	0.26***	0.22***	0.22***	0.20***	-0.12*	-0.14**	0.09	0.15**	0.00	-0.07	-					
12. Externalizing _m , T1	0.27***	0.27***	0.30***	0.32***	-0.29***	-0.30***	0.20***	0.23***	-0.22***	-0.18***	0.53***	-				
13. Internalizing _f , T2	0.20***	10*	0.12*	0.09	-0.06	-0.08	0.12*	0.17**	-0.03**	-0.05	0.52***	0.20***	-			
14. Externalizing _f , T2	0.23***	0.18***	0.25***	0.22***	-0.19***	-0.16**	0.26***	0.28***	-0.24***	-0.23***	0.28***	0.53***	0.41***	-		
15. Internalizing _m , T3	0.17**	0.11*	0.09	0.16***	-0.09	-0.14**	0.05	0.14**	-0.05	-0.07	0.41***	0.18***	0.57***	0.23***	-	
16. Externalizing _m , T3	0.21***	0.13*	0.17**	0.21***	-0.19***	-0.14**	0.18***	0.18***	-0.31***	-0.22***	0.16**	0.42***	0.18***	0.58***	0.38***	-

m mother, *f* father, *a* adolescent
 p* < 0.05, *p* < 0.01, ****p* < 0.001

Concurrent Links: Parenting Stress, Parenting Behaviors, and Adolescent Behavior Problems

The results of the mediation analysis, including concurrent links, autoregressive links, and longitudinal links are presented in Table 3 (Supplementary Materials). Model fit statistics indicated adequate model fit (CFI = 0.92, RMSEA = 0.09, SRMR = 0.04, $\chi^2(37) = 170.53, p < 0.001$). At the 13-year time point, greater maternal and paternal parenting stress was related to more externalizing ($r_{\text{maternal stress}} = 0.25; r_{\text{paternal stress}} = 0.23$) and internalizing ($r_{\text{maternal}} = 0.22; r_{\text{paternal}} = 0.18$) behavior problems of adolescents. Higher levels of maternal and paternal parenting stress were also associated with more perceived overreactivity of both mothers ($r_{\text{maternal}} = 0.26; r_{\text{paternal}} = 0.20$) and fathers ($r_{\text{maternal}} = 0.20; r_{\text{paternal}} = 0.25$) and with less perceived warmth of both mothers ($r_{\text{maternal}} = -0.19; r_{\text{paternal}} = -0.16$) and fathers ($r_{\text{maternal}} = -0.17; r_{\text{paternal}} = -0.18$). In addition, maternal and paternal overreactivity at the adolescent's age of 13 were positively associated with adolescent externalizing ($r_{\text{maternal}} = 0.28; r_{\text{paternal}} = 0.32$) and internalizing ($r_{\text{maternal}} = 0.24; r_{\text{paternal}} = 0.24$) problems at that age. Likewise, lower levels of maternal and paternal warmth were related to more adolescent externalizing ($r_{\text{maternal}} = -0.28; r_{\text{paternal}} = -0.30$) and internalizing ($r_{\text{maternal}} = -0.15; r_{\text{paternal}} = -0.17$) behavior at age 13. At the 15-year time point, higher levels of maternal and paternal overreactivity were related to more adolescent externalizing ($r_{\text{maternal}} = 0.16; r_{\text{paternal}} = 0.17$) problems, but not internalizing ($r_{\text{maternal}} = 0.00; r_{\text{paternal}} = 0.04$) problems. Finally, less maternal and paternal warmth at age 15 was associated with more adolescent externalizing ($r_{\text{maternal}} = -0.19; r_{\text{paternal}} = -0.21$), but not internalizing ($r_{\text{maternal}} = 0.03; r_{\text{paternal}} = 0.06$) problems at that age.

Autoregressive Links: Parenting Behaviors and Adolescent Behavior Problems

Parenting behaviors of mothers and fathers were moderately stable from 13 to 15 years for both overreactivity ($\beta_{\text{maternal}} = 0.57; \beta_{\text{paternal}} = 0.53$) and warmth ($\beta_{\text{maternal}} = 0.56; \beta_{\text{paternal}} = 0.56$) as perceived by adolescents. Also for adolescent internalizing and externalizing problems, fairly high stability coefficients were found from 13 to 15 years ($\beta_{\text{externalizing}} = 0.55; \beta_{\text{internalizing}} = 0.58$) and from 15 to 18 years ($\beta_{\text{externalizing}} = 0.58; \beta_{\text{internalizing}} = 0.57$).

Direct Longitudinal Links: Parenting Stress, Parenting Behaviors, and Adolescent Behavior Problems

Maternal parenting stress at the adolescent's age of 13 positively predicted adolescent externalizing ($\beta = 0.08$), but not internalizing problems ($\beta = 0.05$) at age 18. Parenting

stress of fathers was not significantly related to adolescent externalizing ($\beta = -0.08$) or internalizing ($\beta = -0.03$) behavior across the 5-year interval. Similarly, parenting stress at age 13 was not significantly associated with overreactivity ($\beta = 0.00-0.08$) or warmth ($\beta = -0.01$ to -0.06) of mothers and fathers, as perceived by adolescents at age 15. Constraining the relations between parenting stress and parenting behaviors to be equal between parents revealed no gender differences in this pathway, $\Delta\chi^2(2) = 0.28$, $p = 0.868$, $\Delta CFI = 0.00$. Concerning the crossover from parenting stress on parenting behaviors of the other parent, no gender differences were found either, $\Delta\chi^2(2) = 0.47$, $p = 0.790$, $\Delta CFI = 0.00$. This indicates that the longitudinal (crossover) associations of parenting stress with adolescent-perceived overreactivity and warmth were similar for mothers and fathers. Regarding parenting behaviors, perceived parental warmth and overreactivity at age 15 did not significantly predict externalizing ($\beta = 0.00$ to -0.09) or internalizing ($\beta = -0.00$ to 0.05) problems of adolescents at age 18.

Concerning child effects, when adolescents reported higher levels of internalizing behavior problems at age 13, mothers showed more warmth as perceived by adolescents at age 15 ($\beta = 0.13$). However, adolescents' internalizing and externalizing problems at age 13 were not significantly related to the other measures of parenting behaviors across the 2-year interval ($\beta = -0.01$ to -0.10).

Indirect Longitudinal Links: Testing Mediation by Parenting Behaviors

Results concerning the indirect effects from parenting stress, via adolescent-perceived parenting, to adolescent behavior problems are displayed in Table 4 (Supplementary Materials). Perceived parenting behaviors did not mediate the relationship between parenting stress at age 13 and adolescent behavior problems at age 18. Multiple group analyses showed that model fit did not significantly improve when all regression paths were freely estimated across boys and girls $\Delta\chi^2(20) = 27.74$, $p = 0.116$, $\Delta CFI = -0.01$. This suggests that the hypothesized associations were similar for boys and girls. The total longitudinal mediation model explained 40.8% and 35.7% of the variance in adolescents' externalizing and internalizing behaviors at age 18, respectively.

Discussion

In the current study, we examined the associations between parenting stress, adolescent-perceived parenting behaviors, and adolescent problem behavior from a family systems perspective. Based on Abidin's (1992) stress model, we tested whether parenting behaviors mediated the link

between mother's and father's parenting stress and adolescent behavior problems using a longitudinal mediation design. Our results demonstrated that maternal, but not paternal, parenting stress at age 13 positively predicted adolescent externalizing problems at age 18. Yet, despite cross-sectional significant associations, parenting stress was not related to subsequent adolescent internalizing problems, neither to later parental warmth and overreactivity. Besides, parental warmth and overreactivity as perceived by the adolescent at age 15 were not associated with subsequent adolescent internalizing and externalizing problems. Consequently, the mediating role of parenting behaviors was not supported. We found no crossover effects or mother-father differences in the pathway from parenting stress to parenting behaviors.

First of all, our longitudinal findings did not provide support for Abidin's stress model, which postulates that maladaptive parenting behaviors mediate the link between parenting stress and negative child outcomes. Our autoregressive model showed that parenting stress of mothers and fathers did not predict change in perceived parenting behaviors or in adolescent behavior problems over time. However, there was one exception: When mothers perceived more parenting stress at the adolescent's age of 13, adolescents reported more externalizing problems at age 18. In addition, adolescent-perceived parenting behaviors were not associated with subsequent changes in internalizing or externalizing problems of adolescents. The lack of longitudinal associations is not in line with previous cross-lagged findings among younger children (4–10 years) pointing to effects from initial parenting stress to later parental behaviors and child behavior problems (Mackler et al. 2015; Neece et al. 2012).

Interestingly, our cross-sectional findings demonstrated that higher levels of parenting stress at age 13 were related to more parental overreactivity and less warmth, which, in turn, were associated with adolescent internalizing and externalizing problems at that age. Also at age 15, parental overreactivity and warmth were concurrently related to adolescent behavior problems in the hypothesized directions. These cross-sectional associations are in accordance with previous studies (e.g., Anthony et al. 2005; Healy et al. 2015; Piquart 2017; Putnick et al. 2008) and with the relations proposed by Abidin's stress model. Moreover, our results expand the current body of literature by showing crossover relations between mothers and fathers in the context of parenting stress: When fathers reported higher levels of parenting stress, mothers displayed more maladaptive parenting behaviors, and vice versa. These findings emphasize the importance of considering the interdependency of individual family members as described by the family systems theory (Cox and Paley 1997; Minuchin 1974) when studying parenting.

The discrepancies between our longitudinal and (existing) cross-sectional findings suggest that the actual impact that parents have on their children's outcome may be relatively weak. This suggestion is in real with recent findings from studies that employ innovative methods to separate within- and between family- influences, showing that correlations were abundant at the between-family level, but that effects from parents to child outcomes were rare at the within-family level (Van Lissa et al. 2019). Similarly, in other studies using advanced longitudinal methods, little evidence was found for parenting effects over time (for a systematic review, see Boele et al. 2019). This suggests that previous cross-sectional studies have either mainly captured the impact of children's outcomes on their parents' behavior (reversed causality) or selection effects. Our results, and in particular the discrepancies between our finding and those of existing cross-sectional studies, fit the broader ongoing discussion about the need to employ more innovative analytical methods to accurately understand what impact parents have on their children's outcomes.

Additionally, our findings raise questions about the time scale at which changes in parent and adolescent behavior occur and how these could be studied. Whereas the previous cross-lagged studies on parenting stress (Mackler et al. 2015; Neece et al. 2012) used time intervals of 1 year, our time intervals between parenting stress and parenting behaviors (2 years) and between parenting stress and adolescent behavior problems (5 years) may have been too large to capture any effects (Boele et al. 2019). Even though we did not find support for the longer-term processes, it is still possible that an escalating cycle of dysfunctional exchanges between parents and adolescents occurs over shorter time intervals. If a parent increases negative parenting behaviors, adolescents might not necessarily wait 3 years to change their behaviors. It is possible that such processes happen more immediately or within a time frame of a couple of weeks (Besemer et al. 2016; Coley and Medeiros 2007). A recent meta-analysis indicated that in the majority of empirical studies, changes in parenting and adolescent behavior were found to cooccur simultaneously within families, but these changes were not related to each other over a period of 6 months or longer (Boele et al. 2019). Given these findings, it would be interesting to combine micro- and macro-longitudinal approaches to investigate the moment-to-moment interactions between fathers, mothers, and adolescents over the course of several months, for example, by implementing experience sampling methods.

Furthermore, our findings showed that when adolescents reported higher levels of externalizing behavior problems at age 13, mothers showed less warmth as perceived by adolescents at age 15. This finding is in line with prior work indicating that difficult child behavior may decrease positive

parenting behaviors (Kiff et al. 2011). Interestingly, adolescent internalizing problems at age 13 predicted *more* perceived maternal warmth at age 15. Although this might seem surprising, it has also been suggested that child effects could occur in an opposite direction, such that negative child behavior actually leads to improved parenting, as some parents may respond to their anxious children with greater warmth and involvement to be responsive to their children's needs (Wood et al. 2003; Rubin et al. 2001). These results fit the notion of transactional models that parents and children affect each other bidirectionally (Sameroff 2009). Yet, we were not able to test a fully cross-lagged model with the current data. In future empirical work, it would be valuable to examine bidirectional relationships using cross-lagged models covering both childhood and adolescence, to unravel how the relation between parenting stress and child maladjustment develops over time.

Our findings underscore the need for targeting parenting stress and its ramifications at the family level. As the parenting stress of one parent may negatively affect the concurrent parenting behavior of the other parent, multiple family levels need to be targets of intervention. It is recommended that clinicians do not only support mothers to cope with having a child in adolescence and the stress that this may cause, but also engage fathers and adolescents. In fact, engaging both parents and children in parenting interventions can increase the positive impact on family and child functioning (Panter-Brick et al. 2014). Moreover, since parenting stress among these parents was also concurrently related to their own dysfunctional parenting behavior, parents with higher levels of parenting stress are in need of being supported in developing and maintaining effective disciplinary techniques. For these families, programs that either focus on reducing feelings of parenting stress or teach more adaptive parenting strategies may both be effective in optimizing adolescent outcomes, perhaps especially in decreasing externalizing problems. One way to target parenting stress is by enhancing feelings of parental self-efficacy and satisfaction, for instance, through performance mastery and role modelling, as such strategies have been found to be effective in reducing parenting stress (e.g., Bloomfield and Kendall 2012; Jackson and Moreland 2018).

Strengths and Limitations

This study contributes to the current body of research by applying Abidin's stress model to adolescent behavior problems and testing the lagged associations between parenting stress, parenting behaviors, and adolescent behavior problems over a 5-year period. We sought to clarify the current, conflicting body of literature examining Abidin's stress model by testing an innovative, longitudinal

mediation model that accounts for the stability of adolescent and parenting behaviors over time. Besides, adopting a family systems approach enabled us to investigate cross-over processes between fathers and mothers in the pathways from parenting stress to parenting behaviors. Moreover, we used a multi-informant design, including both father and mother reports of parenting stress, combined with adolescent reports of parenting behaviors and adolescent behavior problems.

Nonetheless, the findings of the current study should be interpreted in light of some limitations. First, owing to the large sample, all constructs were assessed by questionnaires. Although we were able to reduce single-rater bias by including mother, father, and adolescent reports, adolescents reported on both parenting behaviors and their own behavior problems. Future studies using a multimethod strategy (e.g., inclusion of parenting observations) may further reduce rater bias and the possible influence of adolescents' mood on their ratings (Podsakoff et al. 2012).

Second, we were unable to separate parents' social influences from their genetic ones. The concurrent associations of parenting stress and parenting behavior with adolescent maladjustment possibly not only reflect environmental influences, but also genetic transmission responsible for behavioral and emotional problems in both parents and adolescents (McAdams et al. 2014). Given the design of our study, the argument of genetic influence remains speculative, and future studies with a genetically informed design could investigate this possibility.

Third, our sample concerned a predominantly white, middle-class community sample. These families probably experience less personal or contextual stress than families in at-risk or clinical samples. Additionally,

the associations between parenting stress, parenting behaviors, and adolescent outcomes are potentially different in families from other subpopulations. For instance, parent-adolescent interactions and relationships can have different characteristics and functions in different cultures (e.g., in relation to the cultural norms for developmental tasks; Trommsdorff 2006). To generalize our results to other settings, future research should assess parenting stress and its consequences across families from different subpopulations.

Despite these limitations, our study expands previous work by applying advanced modelling using a longitudinal, multi-informant design. Our cross-sectional analyses demonstrated, in line with previous studies, that parenting stress was associated with more concurrent maladaptive parenting behaviors, which were related to more adolescent externalizing and internalizing problems. However, in longitudinal analyses, we only found that parenting stress was related to later adolescent externalizing problems, but not to internalizing problems nor to parenting behaviors.

Together, these nuanced results highlight the importance of examining parent-child effects longitudinally and emphasize that targeting parenting stress may help to reduce adolescent externalizing problems and its ramifications.

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Author Contributions D.M.: executed the study, analysed the data, and wrote the manuscript. P.J.: assisted in the data analyses and collaborated in writing multiple versions of the manuscript. P.P.: designed and executed the study, and collaborated in writing multiple versions of the manuscript. R.K.: collaborated in writing multiple versions of the manuscript. I.F.: collaborated in writing multiple versions of the manuscript. N.L.: collaborated in writing multiple versions of the manuscript.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee (the board of the Katholieke Universiteit Leuven + OT 98/12 ZKA 2922) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study is conducted in full compliance with pertinent international treaties, national laws, regulations and codes concerning research involving minors (adolescents), as well as privacy. The study protocol meets since the beginning in 1999 the requirements of the codes of conduct of pertinent professional associations, in particular of national and international psychological and behavioral associations. Given that neither interventions nor invasive actions are part of this study, the board of the Katholieke Universiteit Leuven approved this study and conforming the Belgian law no further approval was needed. The Belgian law on research with human subjects stipulates that a scientific research project is subject to formal ethical approval by a Medical-Ethical Committee if it is explicitly relevant to the medical science and experiments are used (Art. 1). In this project no medications or experiments are involved.

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