

Longitudinal Associations Between Perceived Parent-Child Relationship Quality and Depressive Symptoms in Adolescence

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Abstract This longitudinal study examined bidirectional paths between perceived parent-adolescent relationship quality and depressive symptoms, as well as the moderating role of sex, age, and personality type. 1313 Dutch adolescents (51% girls) from two cohorts (923 12-year olds and 390 16-year olds at Wave 1) reported on their personality, depressive symptoms, and perceived relationship quality to parents in four waves. Consistent with a relationship erosion perspective, depressive symptoms negatively predicted perceived relationship quality with parents. Relationship quality to mothers predicted depressive symptoms for boys and girls, but relationship quality to fathers predicted depressive symptoms only for boys. Personality type only moderated initial associations between relationship quality with mothers and depressive symptoms, which were stronger for Overcontrollers and Undercontrollers than for Resilients. Results thus reveal a pattern of mutual influence between perceived relationship quality and depressive symptoms that is moderated by the interplay among parent and adolescent sex and adolescent personality type.

Keywords Adolescence · Depression · Parent-child relationships · Personality · Sex differences

Adolescence is a vulnerable period for developing depression and, particularly among girls, depressive symptoms increase from early adolescence onwards (Cole et al. 2002; Rudolph et al. 2000). The quality of the parent-adolescent relationship is thought to be important for preventing

adolescent depressive symptoms (Cummings and Cicchetti 1990). The evidence for concurrent associations between parent-adolescent relationship quality and adolescent depressive symptoms is overwhelming (Heaven et al. 2004; Pavlidis and McCauley 2001; Sheeber et al. 2001). With notable exceptions, these studies depart from a parent-effect model, interpreting their findings as evidence for the influence of parents on adolescents' depressive symptoms, and failing to recognize the role of child effects in this association. Nevertheless, parent-adolescent relationship quality may partly be a result of adolescents' behavior (Bell 1968). Moreover, adolescents' individual characteristics, such as their personality, may make them differentially susceptible to parental influence (Belsky 1997). The current study examined longitudinal bidirectional effects between adolescent-reported relationship quality to parents and depressive symptoms, as well as the role of adolescent sex, age, and personality type in these effects.

Direction of Effects between Perceived Relationship Quality and Adolescent Depressive Symptoms

Problems in parent-adolescent relationships have over and over again been recognized as a risk factor for the development of depressive symptoms. According to attachment theory (Bowlby 1973), theories regarding the connectedness-individuation link (Grotevant and Cooper 1986), and theories dealing with parenting practices (Baumrind and Black 1967), positive developmental outcomes with lower levels of depressive symptoms occur when adolescents have close relationships with their parents. Lower quality relationships with parents may lead to more depressive symptoms because adolescents in such relationships experience low support when facing

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emotional problems (Cobb 1976). The perception of being accepted and valued is thought to boost self-esteem and self-efficacy, which protects against depressive feelings (Windle 1992).

Depressive symptoms may also lead to lower levels of perceived relationship quality. According to Coyne's interpersonal theory of depression (Joiner and Coyne 1999), there is a deleterious feedback loop between depressive symptoms and relational experiences. Through a process of support erosion, adolescent depressive behavior may elicit more negative, rejecting responses and fewer positive behaviors from parents (Coyne et al. 1991; Hale 2001; Rudolph et al. 2000), which may result in lower perceived relationship quality by the adolescent.

Although child characteristics are thought to be important in shaping parenting (Bell 1968; Belsky 1997) and the role of child characteristics is recognized in Coyne's interpersonal theory of depression, most empirical studies investigating associations between adolescent depressive symptoms and parent-adolescent relationship quality have emphasized a parent-effect model and used concurrent or cross-lagged correlations that do not permit conclusions about the underlying processes (Neyer and Asendorpf 2001). To examine the direction of effects between perceived parent-adolescent relationship quality and adolescent depressive symptoms, longitudinal models are needed that control for Time 1 associations, stability, and correlated change of adolescent behavior and perceived relationship quality when estimating the reciprocal effects between these variables.

Longitudinal studies examining effects between parent-child relationship quality and depressive symptoms while controlling for initial associations and stability of depressive symptoms are relatively sparse. Most longitudinal studies have only tested direct effects of relationship quality on later depressive symptoms, and show mixed evidence for effects of parent-child relationship quality on depressive symptoms. For instance, parental rejection did not predict depression over time within a sample of adolescents aged 13 to 17 years (Robertson and Simons 1989), and parental support was not related to increases in depressive symptoms among adolescent girls aged 11 to 15 years (Burton et al. 2004). In contrast, among middle adolescents, higher parental support predicted decreases in depressive symptoms for girls but not for boys (Windle 1992), 13-year old adolescents who reported higher quality of relationship with mother reported less depressive symptoms one year later (Allen et al. 2006), and maternal and paternal support reduced depressive symptoms during late adolescence (Meadows et al. 2006).

Even fewer studies examined bidirectional effects between parent-adolescent relationship quality and adolescent depressive symptoms over time using a full

reciprocal design, and results of these studies are inconsistent. Among 11 to 16 year-olds, parental support was not related to adolescents' depression two years later, and depression did not predict changes in parental support over time (Young et al. 2005). A few studies reported significant effects of parental support on later depressive symptoms, but no effects of depressive symptoms on parental support over time (Sheeber et al. 1997; Stice et al. 2004; Zimmerman et al. 2000). Only one study found depressive symptoms to predict a decrease in perceived family support for girls but not boys during late adolescence (Slavin and Rainer 1990). In sum, the relatively few studies that used full reciprocal longitudinal models to examine the direction of effects between parent-adolescent relationship quality and adolescent depressive symptoms provide mixed findings.

The Moderating Role of Sex, Age, and Personality Type

The inconsistent findings on the longitudinal links between parent-adolescent relationship quality and adolescent depressive symptoms may be due to differences in adolescents' individual characteristics that make them differentially susceptible to risk factors (Nolen-Hoeksema and Girgus 1994). Factors that may affect not only adolescents' vulnerability to depressive symptoms but also their sensitivity to parent-child relationship quality are personality type, sex, and age. Also, there may be differences for perceived relationship quality with fathers and mothers.

According to the differential susceptibility hypothesis, personality characteristics may make adolescents more or less vulnerable for effects of relationship quality with parents. Among older children and adolescents, three broad personality types (Block 1971) have been distinguished based on combinations of personality dimensions: Resilients, Overcontrollers, and Undercontrollers (Asendorpf et al. 2001; De Fruyt et al. 2002; Van Aken and Dubas 2004). Resilient adolescents score high on emotional stability and above average on extraversion, agreeableness, conscientiousness, and openness. Undercontrollers score low on conscientiousness and agreeableness and have a tendency toward externalizing problems. Overcontrollers, in contrast, score low on emotional stability and extraversion, high on conscientious and are disposed towards internalizing problems. Given that emotional instability and introversion are related to depressive symptoms (Heaven et al. 2004), overcontrolling adolescents are more prone to depressive problems than both resilients and undercontrollers.

The association between relationship quality to parents and depressive symptoms may vary across personality types. Because resilient children adapt easily to their

environments, they may be less affected by the quality of the parent-adolescent relationship. Overcontrollers in particular may display depressive symptoms in response to lower quality of parent-adolescent relationship. Based on the differential susceptibility perspective, we expect that the effect of perceived parent-adolescent relationship quality on adolescent depressive symptoms is strongest for Overcontrollers. In addition, we will explore how personality moderates within-wave associations between perceived relationship quality to parents and depressive symptoms and effects of adolescent depressive symptoms on perceived parent-adolescent relationship quality.

A few studies examined the moderating role of adolescent temperament, which has been related to the Big Five personality dimensions both conceptually and empirically (van Lieshout 2000; Rothbart and Bates 1998). In a sample of early adolescents, low parent-child relationship quality increased the odds of an elevated depression trajectory, and childhood temperament and sex did not moderate this effect (Brendgen et al. 2005). In contrast, among preadolescents, frustration moderated the association of depressive symptoms with lack of warmth and overprotection, and fearfulness moderated the association of depressive symptoms with rejection in girls (Oldehinkel et al. 2006).

Sex of parent and adolescent may also affect associations between perceived relationship quality and depressive symptoms. Being a boy or a girl may affect not only the level of depressive symptoms but also the way the parent-adolescent relationship affects depressive symptoms. Girls generally display higher levels of depressive symptoms than boys. Moreover, whereas depressive symptoms increase from early adolescence onwards among girls, they tend to decrease across adolescence among boys (e.g., Lansford et al. 2006; Rudolph et al. 2000). Also, girls exhibit an increasingly stronger relational orientation and greater emotional needs in adolescence than boys (Cyranowski et al. 2000; Rudolph 2002) and girls may therefore be more sensitive to interpersonal difficulties with parents. As most studies have focused on the relationship with mother or collapsed across parents (Sheeber et al. 2001), very little information on the role of fathers is available. Some studies found equal relations between parent-adolescent relationship quality and depressive symptoms for boys and girls (Eberhart et al. 2006). Sheeber and colleagues (2007) showed that adverse father-adolescent relationships are associated with depressive symptomatology in much the same way as mother-adolescent relationships, and that these findings were not moderated by child sex. Nevertheless, Meadows et al. (2006) showed that maternal support and depressive symptoms were more strongly related for females than for males, but no sex difference was found for paternal support. Also, several studies have found poorer parent-adolescent relationship quality to affect later depressive symptoms in adolescent

girls more strongly than in boys (e.g., Slavin and Rainer 1990; Windle 1992). We are not aware of any studies examining bidirectional effects over time between perceived parent-adolescent relationship quality and adolescent depressive symptoms while distinguishing sex of parent and child.

Adolescent age may also moderate the associations between perceived parent-adolescent relationship quality and adolescent depressive symptoms. Since parent-adolescent relationships become more equal over time (Russell et al. 1998) and adolescents become increasingly autonomous (Grotevant and Cooper 1986), associations may become weaker over time and the influence of perceived parent-adolescent relationship quality on depressive symptoms may become smaller as adolescents grow older.

Aims of the Current Study

The aims of the current study were to examine the longitudinal bidirectional effects between perceived relationship quality with fathers and mothers and depressive symptoms in adolescents 12 to 20 years of age and the role of age, sex, and personality type in these effects. Specifically, we will examine whether lower levels of perceived relationship quality predict higher levels of depressive symptoms or whether higher levels of depressive symptoms predict lower levels of perceived relationship quality over time. Moreover, we will examine whether these associations differ by age, sex, and personality type. Although there is no conceptual basis for moderating hypotheses with regard to the child effects model, we will examine moderating effects on the initial correlations, parent effects, and child effects.

Method

Participants

Participants were 1313 Dutch adolescents (676 girls, 51%) of the young and old adolescent cohorts participating in the ongoing longitudinal study CONflict And Management Of Relationships study (CONAMORE; Meeus, et al. 2006). The sample consisted of 923 early adolescents (mean age 12.42 years, $SD=0.59$) and 390 middle adolescents (mean age 16.68 years, $SD=0.80$, at Wave 1). The early-to-middle adolescent cohort consisted of 468 boys (50.7%) and 455 girls (49.3%), the middle-to-late adolescent cohort consisted of 169 boys (43.3%) and 221 girls (56.7%). Eighty-five percent of the adolescents identified themselves as being Dutch; the other 15% belonged to various non-Western ethnic groups.

Sample attrition was 1.2% across waves. Across waves 7.14% of the data was missing. Little's Missing Completely At Random Test (Little 1988) revealed a normed χ^2 (χ^2/df) of 1.25, which indicates a good fit between sample scores with and without imputation (Bollen 1989).

Procedure

Adolescents came from various high schools in Utrecht and surroundings. Before the study, both students and their parents received written information and, if the student elected to participate, were required to provide written informed consent; less than 1% decided not to participate. Adolescents filled out a battery of questionnaires at school after school hours. Confidentiality was guaranteed explicitly. Each wave, respondents received € 10 (US \$ 13) after completing the questionnaires.

Measures

Depressive symptoms were measured annually with the Children's Depression Inventory (CDI, Kovacs 1985), a symptom-based measure consisting of 27 items rated on a 3-point Likert scale ranging from *not true* to *very true*. Sample items are: "I worry all the time about all kind of things", and "I feel tired all the time". The CDI has good internal consistency and test-retest reliability (Finch et al. 1987) and adequate factor validity (Craighead et al. 1998). Cronbach's alpha in the current sample ranged from 0.89 to 0.92 across waves.

Perceived relationship quality was measured in all waves except for Wave 2 with the Inventory of Parent and Peer Attachment (IPPA, Armsden and Greenberg 1987; Raja et al. 1992), a self-report questionnaire using a 5-point Likert-type scale (1 = *very untrue* to 5 = *very true*). Adolescents rated their quality of relationship with father and mother on three subscales. The Communication scale contains three items and measures to what extent an adolescent experiences having high quality of communication with parents. An example: "If my father/mother knows something is bothering me, he/she asks me." The Trust scale also contains three items and measures the extent to which an adolescent trusts parents to respect and accept his or her feelings and wishes. An example: "My father/mother respects my feelings." The Alienation scale consists of 6 items and measures the degree to which an adolescent experiences negative feelings toward parents. An example: "I don't get much attention from my father/mother." These scales are combined for each parent in an overall score by computing the mean of the three scales, after recoding the Alienation scale (Armsden and Greenberg 1987). Correlations between perceived relationship quality with fathers and mothers ranged from $r=0.53$ to $r=0.63$ across waves.

Reliability (Cronbach's alpha) across waves ranged from 0.89 to 0.90 for the overall perceived relationship quality score.

Personality type Adolescents judged their own personalities on a Dutch adaptation of 30 adjective Big Five personality markers selected from Goldberg (1992). The adolescents annually rated the 30 adjectives along a seven-point Likert scale ranging from (1) very untrue to (4) sometimes untrue, sometimes true to (7) very true. All personality characteristics are measured with 6 items, such as: talkative (Extraversion), sympathetic (Agreeableness), systematic (Conscientiousness), worried (Emotional Stability, reversed scored), and creative (Openness to Experience). The internal consistencies (Cronbach's alpha) for the different dimensions of personality ranged from 0.74 to 0.92.

We used Latent Class Growth Analysis (LCGA; Nagin and Tremblay 2001) to examine whether different classes of adolescents could be identified based on developmental trajectories of Big Five characteristics Block (1971) originally made a case for studying types of *personality development*, or a typology that reflects the way personality types manifest themselves during different periods of the life course, thereby accounting for normative personality development. We used an accelerated growth curve design (Duncan et al. 2001) with the scores of the younger cohort for five consecutive waves from age 12 until age 16, and the scores of the older cohort from age 16 until age 20. The loadings on the slope factor for the first age cohort ranged from 0 to 4 from Wave 1 to Wave 5, and the same loadings for the second age cohort ranged from 4 to 8. Intercepts and linear and quadratic slopes were constrained to be equal across age cohorts, resulting in one single developmental pathway for each dimension from age 12 to age 20.

We used several criteria (Muthén and Muthén 2000) to determine the number of developmental personality types. First, we used the Sample Size Adjusted Bayesian Information Criterion (SSA-BIC). The optimal model has the lowest SSA-BIC. Second, we assessed the entropy, which can range from 0.00 to 1.00, with higher figures representing a more accurate classification. Third, theoretical meaningfulness of classes in the various solutions was considered. The SSA-BIC for models with 1 to 5 classes were 93684.20, 90422.76, 87872.31, 86568.72, and 85742.67. Entropy for models with 2 to 5 classes were 0.93, 0.91, 0.92, and 0.91, respectively. As entropy was comparable across models, SSA-BIC did not decrease as strongly for the models with 4 and 5 classes as for the models with 2 and 3 classes, and the models with 4 and 5 classes contained classes that were slight variations of some of the classes that were already present in the three-class solution, we chose the three-class solution as our final

solution. This solution was highly comparable to a personality typology on the younger cohort (see Klimstra et al. 2009a).

The three-class solution had an acceptable entropy of 0.91, and differentiated well between classes with class-probabilities ranging from 91 to 95% (Muthén and Muthén 2000). In the resulting class solution, 464 adolescents (35%) were classified as Overcontrollers, 370 (28%) as Undercontrollers, and 479 (37%) as Resilients. Compared to the other types, Overcontrollers had particularly low levels of extraversion and emotional stability, and Undercontrollers were characterized by low levels of conscientiousness and openness to experience and low levels of agreeableness that increased over time. Resilients scored relatively high on all factors and higher than the other types on extraversion and agreeableness (see Table 1 and Fig. 1). The types manifest themselves in different ways across time and display distinct patterns of normative development. For example, Undercontrollers displayed lower levels of agreeableness in early adolescence, but their agreeableness increased towards the level of Overcontrollers in late adolescence. Similarly, in early adolescence Overcontrollers were already low on extraversion compared to the other types, and as their level of extraversion decreased with age, this difference further increased.

There were no cohort differences in number of adolescents classified as Overcontrollers, Undercontrollers and Resilients ($\chi^2=0.68$, $df=2$, $p=0.71$). Compared to boys, girls were more likely to be classified as Overcontrolling (41% versus 29.4%) and Resilient (39.5%

versus 33.3%) and less likely to be classified as Undercontrolling (19.5% versus 37.4%) ($\chi^2=53.03$, $df=2$, $p<0.01$).

Analytic Strategy

We examined the research questions with cross-lagged path analyses within Mplus (Muthén and Muthén 2007), using four waves of data (i.e., Wave 1, 3, 4, and 5; we left out Wave 2 as perceived relationship quality was not assessed during Wave 2) referred to as Time 1, 2, 3, and 4. In all analyses, missing values (7% across waves) were estimated using Full Information Maximum Likelihood. Data were analyzed for adolescent-father dyads and adolescent-mother dyads separately. First, for all adolescents together, we tested a baseline model in which stability paths of depressive symptoms and perceived relationship quality and within-wave correlations between depressive symptoms and perceived relationship quality were freely estimated, but without any cross-lagged effects between perceived relationship quality and depressive symptoms. We next tested a model with cross-lagged paths from perceived relationship quality to depressive symptoms added to the baseline model, as well as a model with cross-lagged paths from depressive symptoms to perceived relationship quality added to the baseline model.

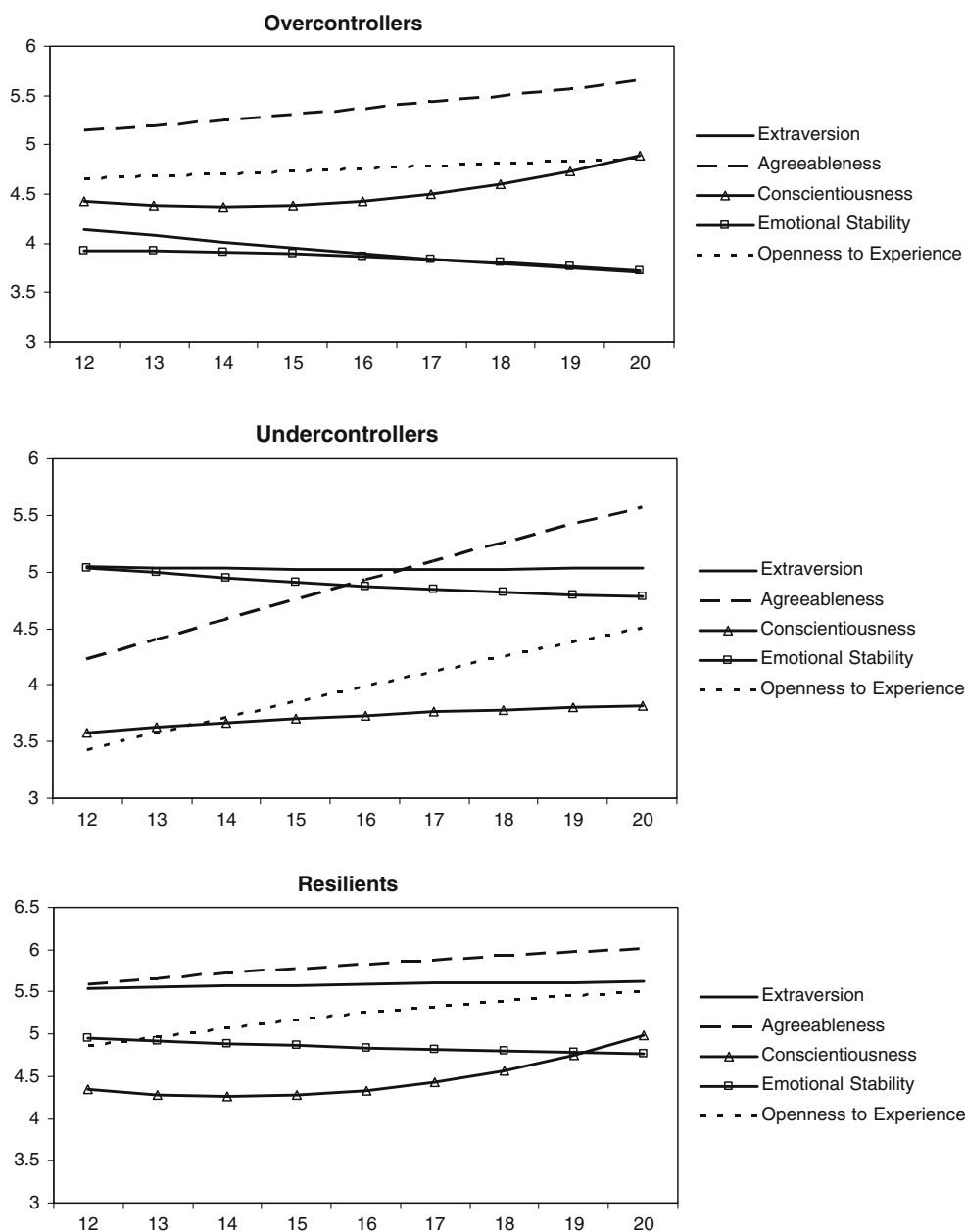
Subsequently, for the model that fitted the data best, we used three series of multigroup analyses to test the moderation effects of age, sex, and personality type on the associations between perceived relationship quality

Table 1 Mean Intercepts and Growth Factors of Personality Types

	Resilients	Undercontrollers	Overcontrollers
Intercepts			
Extraversion	5.54**	5.05**	4.15**
Agreeableness	5.59**	4.22**	5.15**
Conscientiousness	4.35**	3.58**	4.43**
Emotional Stability	4.95**	5.04**	3.93**
Openness	4.86**	3.43**	4.66**
Linear slopes			
Extraversion	0.02	-0.01	-0.07*
Agreeableness	0.07**	0.19**	0.05
Conscientiousness	-0.09**	0.05	-0.06*
Emotional Stability	-0.03	-0.05	-0.00
Openness	0.11**	0.14**	0.03
Quadratic slopes			
Extraversion	-0.00	0.00	0.00
Agreeableness	-0.00	-0.00	0.00
Conscientiousness	0.02**	-0.00	0.02**
Emotional Stability	0.00	0.00	-0.00
Openness	-0.00	-0.00	0.00

* $p<0.05$; ** $p<0.01$

Fig. 1 Estimated growth of extraversion, agreeableness, conscientiousness, emotional stability, and openness for Overcontrollers, Undercontrollers, and Resilients, respectively



and depressive symptoms. We constrained sets of parameters across groups (i.e., 2 cohorts, 2 sexes, or 3 personality types): a) cross-lagged paths from perceived relationship quality to depressive symptoms, b) cross-lagged paths from depressive symptoms to perceived relationship quality, and c) initial correlations.

We evaluated model fit by the comparative fit index (CFI), with values above 0.95 indicating good fit, and the root mean square of error of approximation (RMSEA), with values up to 0.08 representing an adequate fit of the model (Hu and Bentler 1999). Fit of different models was compared using chi-square difference tests as well as change in CFI and RMSEA, with relatively lower RMSEA's and higher CFI's indicating better fit (Kline 2005). When model comparisons

showed that constraining certain paths led to a significant decrease in fit, we used model comparisons of specific paths in specific groups to determine which paths significantly differed from each other.

Results

Descriptive Statistics: Mean Levels of Perceived Relationship Quality and Depressive Symptoms

Mean levels and standard deviations of Time 1 depressive symptoms and perceived relationship quality for each age cohort, sex, and personality type are presented in Table 2.

Table 2 Mean Sex, Age, and Personality Type Differences in Time 1 Depressive Symptoms and Perceived Relationship Quality with Fathers and Mothers

Variable Source	Depressive Symptoms		Perceived Relationship Quality with Fathers		Perceived Relationship Quality with Mothers	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Boys (<i>n</i> =637)	1.17	0.30	3.74	0.83	3.92	0.91
Girls (<i>n</i> =676)	1.19	0.23	3.82	0.81	4.25	0.85
Early (<i>n</i> =923)	1.16	0.26	3.86	0.83	4.13	0.91
Middle (<i>n</i> =390)	1.23	0.28	3.62	0.77	4.02	0.85
Overcontrollers (<i>n</i> =464)	1.26	0.30	3.71	0.80	4.00	0.87
Undercontrollers (<i>n</i> =370)	1.17	0.29	3.59	0.82	3.81	0.90
Resilients (<i>n</i> =479)	1.12	0.20	3.98	0.79	4.38	0.82
$F_{age}(1, 1308)$	21.16**		24.09**		6.55*	
$F_{sex}(1, 1308)$	0.22		1.75		29.48**	
$F_{type}(2, 1308)$	32.69**		21.62**		35.21**	

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

ANOVAs revealed a significant main effect of age cohort for all variables: Older adolescents reported more depressive symptoms and lower quality of relationship with fathers and mothers. A significant main effect of personality type was also found for all variables: both Overcontrollers and Undercontrollers reported lower quality of relationship with fathers and mothers than Resilients and Overcontrollers reported more depressive symptoms than Undercontrollers and Resilients. The only significant main effect for sex was found for perceived quality of relationship with mothers, which was higher for girls than for boys.

Direction of Effects between Perceived Relationship Quality and Depressive Symptoms

We tested for all adolescents together whether the cross-lagged paths between perceived relationship quality and depressive symptoms significantly improved model fit compared to a baseline model with only within-wave correlations between perceived relationship quality and depressive symptoms. For adolescents' relationships with both fathers and mothers, cross-lagged paths from perceived relationship quality to depressive symptoms, as well as cross-lagged paths from depressive symptoms to perceived relationship quality significantly improved model fit compared to the baseline model without these paths (see Table 3). For sake of parsimony, we tested whether cross-lagged paths could be constrained to be equal across waves. For fathers, paths could be constrained to be equal across waves from perceived relationship quality to depressive symptoms, $\Delta \chi_{SB}^2(2, N=1313)=1.80, p > 0.05$, and from depressive symptoms to perceived relationship quality, $\Delta \chi_{SB}^2(2, N=1313)=1.53, p > 0.05$. Similarly, for mothers, paths could be constrained to be equal across waves

from perceived relationship quality to depressive symptoms, $\Delta \chi_{SB}^2(2, N=1313)=1.53, p > 0.05$, and from depressive symptoms to perceived relationship quality, $\Delta \chi_{SB}^2(2, N=1313)=1.79, p > 0.05$. Model fit for the final model was for fathers: $\chi_{SB}^2(10)=6.63, p > 0.05$; CFI=0.99; RMSEA=0.00; and for mothers: $\chi_{SB}^2(10)=20.36, p < 0.05$; CFI=0.99; RMSEA=0.03.

Results (see Table 4) showed that both perceived relationship quality with fathers and mothers and depressive symptoms were moderately stable over time. Within-wave correlations between perceived relationship quality and depressive symptoms were small to moderate. Perceived relationship quality with both fathers and mothers significantly though weakly predicted later depressive symptoms while controlling for earlier depressive symptoms, with β 's ranging from -0.04 to -0.06 . Moreover, depressive symptoms significantly predicted later perceived relationship quality with both fathers and mothers, with β 's ranging from -0.08 to -0.12 .

Age differences in Associations Between Perceived Relationship Quality and Depressive Symptoms

Using multigroup analyses with the two age cohorts as the two groups, we tested whether the associations and cross-lagged paths between perceived relationship quality and depressive symptoms could be constrained to be equal across groups. Chi-square difference tests showed that for adolescents' perceived relationship quality with fathers, the model with different paths for the groups did not provide a better fit to the data than the model with equality constraints across groups for paths from perceived relationship quality to depressive symptoms, $\Delta \chi_{SB}^2(1, N=1313)=1.50$,

Table 3 Model Comparisons of Cross-lagged Path Analysis of Depressive Symptoms and Perceived Relationship Quality with Fathers and Mothers

Model	χ_{SB}^2	Df	CFI	RMSEA	$\Delta \chi_{SB}^2 / \Delta df$
Fathers					
1. Baseline model	65.82**	12	0.97	0.06	
2. Baseline+paths relationship quality → depression	48.49**	9	0.98	0.06	<0.01
3. Baseline+paths depression → relationship quality	15.86	9	0.99	0.02	<0.01
Mothers					
1. Baseline model	57.94**	12	0.98	0.05	
2. Baseline+paths relationship quality → depression	48.81**	9	0.98	0.06	<0.01
3. Baseline+paths depression → relationship quality	25.08**	9	0.99	0.04	<0.01

** $p < 0.01$

$p > 0.05$, for paths from depressive symptoms to perceived relationship quality, $\Delta \chi_{SB}^2 (1, N=1313)=0.20, p > 0.05$, and for initial correlations between perceived relationship quality and depressive symptoms, $\Delta \chi_{SB}^2 (1, N=1313)=1.93, p > 0.05$. Similarly, for adolescents' perceived relationship quality with mothers, the model with different paths for the groups did not provide a better fit to the data than the model with equality constraints across groups for paths from perceived relationship quality to depressive symptoms, $\Delta \chi_{SB}^2 (1, N=1313)=0.08, p > 0.05$, for paths from depressive symptoms to perceived relationship quality, $\Delta \chi_{SB}^2 (1, N=1313)=0.02, p > 0.05$, and for initial correlations between perceived relationship quality and

depressive symptoms, $\Delta \chi_{SB}^2 (1, N=1313)=-4.66, p > 0.05$. Thus, there were no age differences in associations between perceived relationship quality and depressive symptoms between the two cohorts. Model fit for the final model was for fathers: $\chi_{SB}^2 (23)=28.24, p > 0.05$; CFI=0.99; RMSEA=0.02; and for mothers: $\chi_{SB}^2 (23)=43.55, p < 0.01$; CFI=0.99; RMSEA=0.04.

Sex Differences in Associations Between Perceived Relationship Quality and Depressive Symptoms

Using multigroup analyses with the two sexes as the two groups, we tested whether the associations and cross-

Table 4 Cross-lagged Path Analyses of Depressive Symptoms and Perceived Relationship Quality with Fathers and Mothers

Parent	Fathers		Mothers	
	B ¹	β	B	β
Stability paths				
Depression T1 → T3	0.32 (0.24, 0.39)	0.36**	0.32 (0.24, 0.40)	0.36**
Depression T3 → T4	0.47 (0.38, 0.55)	0.47**	0.47 (0.39, 0.56)	0.48**
Depression T4 → T5	0.42 (0.34, 0.49)	0.45**	0.42 (0.35, 0.50)	0.46**
Relationship Quality T1 → T3	0.43 (0.37, 0.50)	0.44**	0.39 (0.33, 0.44)	0.45**
Relationship Quality T3 → T4	0.57 (0.50, 0.63)	0.56**	0.56 (0.49, 0.62)	0.55**
Relationship Quality T4 → T5	0.51 (0.44, 0.58)	0.51**	0.52 (0.46, 0.59)	0.54**
Within-wave correlations				
Relationship Quality T1-Depression T1	-0.06 (-0.07, -0.03)	-0.27**	-0.05 (-0.06, -0.02)	-0.20**
Relationship Quality T3-Depression T3	-0.04 (-0.04, -0.02)	-0.19**	-0.03 (-0.04, -0.02)	-0.16**
Relationship Quality T4-Depression T4	-0.02 (-0.02, -0.00)	-0.10**	-0.03 (-0.03, -0.01)	-0.16**
Relationship Quality T5-Depression T5	-0.01 (-0.02, -0.00)	-0.07**	-0.02 (-0.02, -0.00)	-0.09**
Cross-lagged effects				
Relationship Quality T1 → Depression T3	-0.02 (-0.02, -0.00)	-0.05**	-0.01 (-0.02, -0.00)	-0.04*
Relationship Quality T3 → Depression T4	-0.02 (-0.02, -0.00)	-0.05**	-0.01 (-0.02, -0.00)	-0.04*
Relationship Quality T3 → Depression T5	-0.02 (-0.02, -0.00)	-0.06**	-0.01 (-0.02, -0.00)	-0.04*
Depression T1 → Relationship Quality T3	-0.35 (-0.45, -0.23)	-0.12**	-0.25 (-0.34, -0.16)	-0.09**
Depression T3 → Relationship Quality T4	-0.35 (-0.45, -0.23)	-0.10**	-0.25 (-0.34, -0.16)	-0.08**
Depression T4 → Relationship Quality T5	-0.35 (-0.45, -0.23)	-0.10**	-0.25 (-0.34, -0.16)	-0.08**

* $p < 0.05$; ** $p < 0.01$.¹ Confidence intervals for B's are displayed between brackets.

lagged paths between perceived relationship quality and depressive symptoms could be constrained to be equal for boys and girls. Chi-square difference tests showed that for adolescents' perceived relationship quality with fathers, the model with different paths for the groups provided a better fit to the data than the model with equality constraints across groups for paths from perceived relationship quality to depressive symptoms, $\Delta \chi_{SB}^2(1, N=1313)=4.43, p<0.05$. The models with different paths from depressive symptoms to perceived relationship quality, $\Delta \chi_{SB}^2(1, N=1313)=1.88, p>0.05$, and with different initial correlations between perceived relationship quality and depressive symptoms, $\Delta \chi_{SB}^2(1, N=1313)=0.07, p>0.05$, did not provide a better fit, however. For adolescents' perceived relationship quality with mothers, the model with different paths for the groups did not provide a better fit to the data than the model with equality constraints across groups for paths from perceived relationship quality to depressive symptoms, $\Delta \chi_{SB}^2(1, N=1313)=0.83, p>0.05$, for paths from depressive symptoms to perceived relationship quality, $\Delta \chi_{SB}^2(1, N=1313)=-0.17, p>0.05$, and for initial correlations between perceived relationship quality and depressive symptoms, $\Delta \chi_{SB}^2(1, N=1313)=0.08, p>0.05$. Model fit for the final model was for fathers: $\chi_{SB}^2(22)=18.52, p>0.05$; CFI=1.00; RMSEA=0.00; and for mothers: $\chi_{SB}^2(23)=47.91, p<0.01$; CFI=0.99; RMSEA=0.04.

Thus, there were only sex differences in the paths from perceived relationship quality from fathers to depressive symptoms. Inspection of the sex differences revealed that the paths from perceived relationship quality from fathers to depressive symptoms were stronger for boys than for girls. These paths ranged from -0.09 to $-0.10, p<0.01$ for boys and were non-significant ($-0.03, p>0.05$) for girls.

Differences Between Personality Types in Associations Between Perceived Relationship Quality and Depressive Symptoms

Using multigroup analyses with the three personality types as the three groups, we tested whether the associations and cross-lagged paths between perceived relationship quality and depressive symptoms could be constrained to be equal across Resilients, Overcontrollers, and Undercontrollers. Chi-square difference tests showed that for adolescents' perceived relationship quality with fathers, the model with different paths for the groups did not provide a better fit to the data than the model with equality constraints across groups for paths from perceived relationship quality to depressive symptoms, $\Delta \chi_{SB}^2(2, N=1313)=0.10, p>0.05$, for paths from depressive symptoms to perceived relationship quality, $\Delta \chi_{SB}^2(2, N=1313)=1.57, p>0.05$, and for

initial correlations between perceived relationship quality and depressive symptoms, $\Delta \chi_{SB}^2(2, N=1313)=2.77, p>0.05$. For adolescents' perceived relationship quality with mothers, the model with different paths for the groups did not provide a better fit to the data than the model with equality constraints across groups for paths from perceived relationship quality to depressive symptoms, $\Delta \chi_{SB}^2(2, N=1313)=1.92, p>0.05$, and for paths from depressive symptoms to perceived relationship quality, $\Delta \chi_{SB}^2(2, N=1313)=-5.86, p>0.05$. However, initial correlations between perceived relationship quality and depressive symptoms could not be constrained to be equal, $\Delta \chi_{SB}^2(2, N=1313)=5.80, p<0.05$. Model fit for the final model was for fathers: $\chi_{SB}^2(36)=29.72, p>0.05$; CFI=1.00; RMSEA=0.00; and for mothers: $\chi_{SB}^2(34)=33.55, p>0.05$; CFI=1.00; RMSEA=0.01.

Thus, there were only differences between personality types in the initial correlation between perceived relationship quality from mothers and depressive symptoms. This correlation was $0.20, p<0.01$ for Overcontrollers, $0.22, p<0.01$ for Undercontrollers, and $0.12, p<0.05$ for Resilients. Thus, for Resilients, the association between perceived relationship quality from mothers and depressive symptoms was weaker than for the other personality types.

Discussion

The goal of the present study was to examine whether adolescents' age, sex, and personality type moderate the longitudinal associations between adolescents' perceived quality of the relationship with mothers and fathers and adolescent depressive symptoms. The use of a longitudinal design, spanning the period from early to late adolescence, enabled us to focus on the direction of associations between perceived parent-adolescent relationship quality and depressive symptoms.

As expected, adolescents who reported more depressive symptoms also reported lower quality of relationship to parents, and changes in depressive symptoms over time were related to changes in perceived relationship quality. Although these within-wave associations between depressive symptoms and perceived parent-adolescent relationship quality were quite consistent, they were mostly small to moderate in size. Moreover, our results show that depressive symptoms and perceived quality of the parent-adolescent relationship are bidirectionally longitudinally related to each other while controlling for these within-wave associations, although paths from depressive symptoms to perceived relationship quality tended to be stronger than paths from perceived relationship quality to depressive symptoms.

Adolescents who reported higher levels of depressive symptoms perceived lower quality of relationship with both fathers and mothers one or two years later. These findings may be explained by the process of relational erosion (Joiner and Coyne 1999; Coyne et al. 1991). Depressed adolescents may initially elicit supportive behaviors from significant others, such as parents, by means of their display of depressive behaviors (Hale 2001). However, individuals prone to depressive symptoms lack the necessary social skills to reciprocate support and closeness. Depressed persons specifically look for support from others to offset their negative cognitive beliefs that others are rejecting them (e.g., Beck et al. 1979). These interpersonal interactions are believed to induce a negative mood in the other person. Hence, over time, this initially supportive interaction becomes increasingly rejecting and an interaction pattern emerges in which parents are likely to stop supporting depressed adolescents as a consequence of their negative self-statements, complaints, apathy, reassurance seeking, and social inadequacy (Joiner and Coyne 1999; Hale et al. 2008; Segrin and Dillard 1992). These results seem to suggest that interventions aimed at reducing the impact of adolescents' depressive symptoms on perceived parent-adolescent relationship quality may be efficacious. However, future research is needed to replicate these findings.

Perceived relationship quality was significantly but weakly related to later depressive symptoms one or two years later. For mothers these paths were found consistently, but perceived relationship quality with fathers was related to later depressive symptoms only for boys. These results underscore the importance of including reports on fathers in studies on adolescent internalizing problems and distinguishing between perceived relationship quality with mothers and fathers (Sheeber et al. 2001). An explanation for the lack of an association between relationship quality with fathers and depressive symptoms among girls may be found in the precedence of the relationship with their mother among girls (Youniss and Smollar 1985). Girls' relationship with their mother is generally of higher quality than boys' relationship with their mother. It is also generally of higher quality than the relationship with their father, whereas boys exhibit no such difference in relational quality with their parents (see also Table 2). Girls, then, may be especially attuned to and affected by the relationship with their mother, leaving little room for fathers to exert an influence. For boys, however, fathers seem to play an important role and lower perceived relationship quality with fathers makes boys more depressed over time. At any rate, the findings attest to the importance of relational quality with parents for adolescent depressive symptoms and suggest that it would be important to make sure to involve fathers in therapy for boys with depressive symptoms.

Lack of Age Differences in Associations Between Perceived Parent-Adolescent Relationship Quality and Depressive Symptoms

The associations and cross-lagged paths between perceived parent-adolescent relationship quality and depressive symptoms were quite consistent across age. Associations and cross-lagged paths could not only be constrained for the two age cohorts but also over the different waves within each cohort. So apparently, perceived relationship quality and depressive symptoms are comparably associated across the entire period of adolescence. These findings confirm the continued importance of parents for the adjustment of adolescents across the entire period of adolescence. Future research should examine whether associations remain equal in older samples of young adults.

The Moderating Role of Personality Type

Although the differential susceptibility hypothesis assumes that there are differences among individuals in their susceptibility to environmental influence that result in different developmental outcomes, our longitudinal results did not offer support for this presumed moderating effect in the context of adolescent personality and perceived parent-adolescent relationship quality. Personality type did not moderate the paths from perceived relationship quality to depressive symptoms. Paths from depressive symptoms to perceived relationship quality were also not moderated by personality type. It may be that a one-year or two-year interval is too long to find effects of perceived parent-adolescent relationship quality and that adolescent personality moderates effects of perceived relationship quality on depressive symptoms over shorter time intervals.

The only moderating effects of personality type were found for correlations between perceived mother-adolescent relationship quality and depressive symptoms. This association was found to be stronger for Overcontrollers and Undercontrollers than for Resilients. Although these findings suggest that perceived relationship quality and depressive symptoms go together more strongly for overcontrolling adolescents than for resilient and undercontrolling adolescents, findings were too inconsistent to warrant any strong conclusions.

Nevertheless, personality type also had a main effect on mean levels of depressive symptoms and perceived relationship quality. Overcontrollers and Undercontroller perceived the relationship quality with parents to be lower than Resilients. Overcontrollers also had higher levels of depressive symptoms than Undercontrollers and Resilients. Overcontrollers are characterized by high levels of ego-control and have difficulties regulating their level of ego-control as a function of environmental demands (Block 1971). Their low

levels of Extraversion and Emotional Stability make them vulnerable to internalizing problems such as depression, in particular in the context of negative parenting. The association between depressive symptoms and the quality of the parent-adolescent relationship may be weaker for resilient adolescents because they adapt more easily to their environments than both Undercontrollers and Overcontrollers. This may indicate the potential effectiveness of making parents aware of their adolescent's personality characteristics and their role in depressive symptoms in parent training programs.

Strengths, Limitations and Conclusions

An important strength of our study was the longitudinal design, which allowed us to disentangle the direction of longitudinal paths between perceived parent-child relationship quality and depressive symptoms in the period from early to late adolescence. Despite many theoretical notions that child effects may be important (e.g., Bell 1968), many studies still rely on a parent-effect model. Our study demonstrated that among adolescents, child effects are somewhat stronger than parent effects. In addition, particularly for boys, perceived relationship quality with fathers seems to be important for later depressive symptoms.

The longitudinal design also allowed the construction of longitudinal personality types, which is important given mean-level personality development (Klimstra et al. 2009b). Block (1971) emphasized that personality types should reflect the way they manifest themselves during longer, substantial periods in the life course, and should incorporate normative developmental trends in personality. The longitudinal personality types we found from early to late adolescence show the characteristic differences between the types that are also found in other studies (e.g., Asendorpf et al. 2001; Van Aken and Dubas 2004), and remain clearly distinguishable from one another from early to late adolescence, yet they manifest themselves in different ways across time and display distinct patterns of normative development. There are also limitations. A clear limitation of our study is the use of adolescent self-reports to assess perceived relationship quality with parents and depressive symptoms. As perceptions of relationship quality are to a large extent in the eye of the beholder (Branje et al. 2002), our results may reflect the tendency of adolescents with higher levels of depressive symptoms to increasingly interpret their environment in a negative way. Their negative mood may make depressed adolescents less and less likely to perceive their parents' behaviour as positive. Another limitation is the focus on a population sample, and future studies should address whether our findings replicate in clinically depressed adolescents. Also, our findings do not rule out the possibility that other

factors, such as genetic disposition, affect personality, depressive symptoms, and perceived parent-child relationship quality, resulting in spurious associations among these variables (Neale et al. 1994).

In conclusion, the results of the present study indicate that although perceived parent-adolescent relationship quality and adolescent depressive symptoms are associated, the direction of effects between perceived parent-adolescent relationship quality and adolescent depressive symptoms depends on adolescents' and parents' sex. Depressive symptoms consistently affected future perceived relationship quality, suggesting a support erosion perspective. Relational quality with mothers consistently, though less strongly, predicted depressive symptoms. Only for boys, the perceived quality of the relationship with father was found to be important for later depressive symptoms. Furthermore, our results suggest that mothers matter most among both over- and undercontrolling adolescents who are more vulnerable because of a stronger link between relational quality with mother and depressive symptoms. Thus, our results reveal a pattern of mutual influence between perceived relationship quality and depressive symptoms that is moderated by the interplay among parent and adolescent sex and adolescent personality type. This pattern seems to suggest that treatment intervention might best be primarily focused on how adolescents' depressive symptoms affect their perception of the parent-adolescent relationship quality, and that, although the quality of the relationship with mother is clearly important in depressive symptoms, especially for Over- and Undercontrollers, fathers should not be left out of the equation, especially where their adolescent sons are concerned.

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