Changes in perspective: parenting and well-being of adolescents in daily life

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3

A closer look into the affect dynamics of adolescents with depression and the interactions with their parents: An ecological momentary assessment study

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Abstract

Background: Parental warmth and criticism have been related to depression in adolescents, but information on moment-to-moment experiences of parent-child interactions and adolescent well-being in clinical samples is lacking. The current study used ecological momentary assessment to examine momentary adolescent affect, parental warmth and criticism of mothers and fathers, and its associations in families with an adolescent with a depression versus adolescents without psychopathology.

Methods: A total of 114 adolescents (M_{age} = 15.8, *SD* = 1.41; 67.5% girls) and 209 parents (M_{age} = 49.3, *SD* = 5.73; 54.1% mothers) participated: 34 adolescents with depression and 58 parents and 80 healthy controls and 151 parents.

Results: Preregistered multilevel models showed that adolescents with a depression reported less positive and more negative affect compared to healthy controls. Whereas adolescents with depression and parents reported more negative parenting on retrospective questionnaires, no differences were found in momentary parenting. Perceived parenting of both mothers and fathers was related to adolescent affect, but these associations were not stronger for adolescents with a depression and differed between individuals.

Limitations: Although studies have shown that parenting impacts adolescent well-being, no claims can be made about direction of effects. Moreover, the sample and assessed interactions may be biased resulting in an underestimation of negative parent-adolescent interactions.

Conclusions: Our findings indicate that adolescents generally benefit from supportive parenting and that adolescents with depression may have a negativity bias in their retrospective recall. This highlights the need for more person-centered research to guide family interventions.

Keywords: Adolescents, depression, experience sampling method, parenting, parent-child interactions

Introduction

The prevalence of mood disorders increases substantially during adolescence (Kessler et al., 2005) and an early onset has been associated with higher recurrence rates (e.g., Curry et al., 2011) and adverse psychosocial outcomes in adulthood (e.g., Clayborne et al., 2019). One of the key interpersonal factors that affects adolescent well-being is the relationship with parents (Bronfenbrenner, 1979). Findings based on observational and retrospective self-report studies showed that a lack of warmth and critical parenting are related to depression in adolescents (e.g., Restifo & Bögels, 2009; Sheeber et al., 2001; Yap et al., 2014). These studies, however, mainly focused on averages over families (between-family level), while dynamic systems theories propose that each family is unique with distinct parent-adolescent dynamics (Granic et al., 2003; Kunnen et al., 2019). Detailed information on the moment-to-moment experiences of parent-adolescent interactions within families with an adolescent could provide more valuable insight into parent-adolescent daily life dynamics of these families. This information can ultimately be used for interventions with parenting being a potential malleable factor to target. By using ecological momentary assessment (EMA; Stone & Shiffman, 1994) we therefore aimed to examine adolescent momentary affect and momentary parental warmth and criticism of mothers and fathers (both from the perspective of the adolescent as of the parent) during parent-child interactions in daily life in families with adolescents with a depression (i.e., either a current major depressive disorder (MDD) or dysthymia) compared to families with adolescents without psychopathology (i.e., healthy controls). Additionally, we investigated within-person associations between adolescent perceived parental warmth and criticism of mothers and fathers and adolescent affect during momentary parent-child interactions, and assessed whether these were stronger for adolescents with a depression than healthy controls.

As part of adolescent development, the parent-adolescent relationship transforms to a more egalitarian one (Branje, 2018). Adolescents strive to become more autonomous and parents need to balance supporting this development and keeping their adolescent safe (Baumrind, 1987; Collins, 1997). This renegotiation may become even more challenging when an adolescent is experiencing a depression. Adolescents with a depression may elicit more negative parenting behavior, such as parental rejection or less parental support (e.g., Coyne, 1976). On the other hand, adolescents are also more prone to develop a depression when parenting is (perceived as) more rejecting and/or less supportive by contributing to the development of depressogenic cognitions and negative self-views (e.g., Beck, 1967).

Although parent-adolescent interactions characterized by lack of warmth and support and elevated levels of conflict and criticism have been consistently linked to adolescent depression (e.g., McLeod et al., 2007; Restifo & Bögels, 2009; Sheeber et al., 2001; Yap et al., 2014) and depression later in life (Gibb et al., 2001; Kullberg et al., 2020; Spinhoven et al., 2010), most previous studies were based on retrospective self-report questionnaires spanning large time intervals (e.g., last year or even years). This may involve recall bias (Trull & Ebner-Priemer, 2009) which may even be more substantial for adolescents with a depression (Platt et al., 2017). For clinical interventions, it is important to elucidate whether biases indeed influence adolescents' reports or if parent-adolescent interactions in daily life are actually characterized by a lack parental warmth and support. Including parents' own perception of parenting may contribute to unravel this. Importantly, previous work did not consider

that parenting fluctuates over time (i.e., hours or days) within a family or person (Boele et al., 2020; Darling & Steinberg, 2017; Keijsers & Van Roekel, 2018). EMA is a suitable method to gain more insight into the family-specific dynamics of parent-adolescent interactions and adolescent depression in daily life and assess parenting from both adolescent and parent perspective.

Research on daily life experiences of youth with a depression is still scarce. To date, only 12 EMA studies included adolescents with a clinical depression (see review Thunnissen et al., 2021). Some of these studies found that adolescents with mood disorders report lower levels of positive affect and higher levels of negative affect than healthy controls (Silk et al., 2007; Silk et al., 2011), but others did not find differences in affect between depressed and non-depressed adolescents (Cousins et al., 2011; Doane et al., 2013; Mor et al., 2010). Additionally, despite the unique insight EMA provides into the naturalistic context of adolescents' daily life, only three studies examined the social context (i.e., amount of time spent together or co-rumination with peers or family) of adolescents with a depression (Forbes et al., 2012; Silk et al., 2011; Waller et al., 2014). Quality of time spent together was, however, not assessed while previous studies based on retrospective questionnaires and observations indicated the importance of the quality of interactions on adolescent well-being (e.g. Restifo & Bögels, 2009; Sheeber et al., 2001). As an important next step, we examined momentary positive and negative affect as well as parental warmth and criticism (from both adolescents' and parents' perspective) during parent-adolescent interactions in families with an adolescent with a depression and tested whether these differed from families with an adolescent without psychopathology.

Previous studies have shown that on moments or days when adolescents (in community samples) perceived more perceived parental warmth and less parental conflict, they reported less negative affect and more positive affect, with depressive symptoms influencing this association (Bülow et al., 2022; Janssen et al., 2021; Timmons & Margolin, 2015). For adolescents who reported more depressive symptoms stronger associations were found between daily parental support and conflict and adolescent negative affect compared to adolescents who reported less depressive symptoms (Janssen et al., 2021; Timmons & Margolin, 2015). Since no data exists on clinical samples, the current study extends this work by examining whether the association between momentary perceived parental warmth and criticism of mothers and fathers and positive and negative affect during parent-adolescent interactions was stronger for adolescents with a depression.

The current study aimed to 1) examine whether adolescent momentary positive and negative affect (in general and during parent-adolescent interactions) and momentary parental warmth and criticism during parent-adolescent interactions differed between families with an adolescent with a depression and healthy controls, 2) assess the within-person momentary association between perceived parenting behavior and affect during parent-child interactions, and 3) examine whether this association is stronger for adolescents with depression. We preregistered the study (https://osf.io/qjyp5/?view_only=2d50bab7b908401798ae7694f26faeb0) including the following hypotheses): 1a) adolescents with a depression report less momentary positive and negative affect (in general and during parent-adolescent interactions) than healthy controls; 1b) adolescents with a depression and their mothers and fathers (1c) report less parental warmth and more parental criticism during momentary parent-child interactions than healthy controls; 2) more perceived parental warmth and less perceived parental criticism of mothers and fathers at a given moment is

associated with more positive and less negative affect at the same moment; 3) the associations between perceived parenting of mothers and fathers and adolescent affect during momentary parent-adolescent interactions are stronger for adolescents with a depression compared to healthy controls.

Methods

Sample

Data were used from RE-PAIR (Relations and Emotions in Parent Adolescent Interaction Research), which examines parent-adolescent interactions and adolescent mental well-being by comparing adolescents with a current depression (i.e., either major depressive disorder or dysthymia) and their parents to adolescents without psychopathology and their parents. The RE-PAIR study was approved by the Medical Ethics Review Committee (METC) of Leiden University Medical Centre (LUMC; research protocol: P17.241).

Families were included in the study in case the adolescent was aged between 11 and 17 years at the time of the screening for psychopathology, at least one of the primary caregivers wanted to participate in the study, and all had a good command of the Dutch language. Participation with two parents – if possible – was preferred but this was no requirement. Further inclusion criteria for adolescents were: living at home with at least one primary caregiver and having started secondary school. Adolescents with a depression were included if they met criteria for a current MDD or dysthymia as primary diagnosis. Adolescents who met criteria for a primary diagnosis of another (neuro)psychiatric disorder than depression, a comorbid psychosis, substance use disorder or mental retardation were excluded. For healthy controls the following exclusion criteria applied: having a current mental disorder, a lifetime history of MDD or dysthymia, or a history of psychopathology in the last two years. Adolescent psychopathology was assessed with a face-to-face or online Semi-Structured Interview, the Kiddie-Schedule for Affective Disorders and Schizophrenia – Present and Lifetime Version (K-SADS-PL; Reichart et al., 2000). All participants signed informed consent. If adolescents were younger than 16 years of age, parents with legal custody also signed informed consent for the adolescent.

In total, 114 families participated in the EMA of RE-PAIR. This concerned 80 healthy controls and their 151 parents, and 34 adolescents with a depression and their 58 parents. Current primary diagnosis was MDD for 28 adolescents (82.4%) and dysthymia for 6 adolescents (17.6%). See Appendix 1 for comorbidity of adolescents and psychopathology of parents. Due to a branching error in questionnaires of one healthy control adolescent, we excluded that family resulting in a final sample of 79 healthy controls and 149 parents. Table 1 provides sample demographics. The majority of adolescents (96.3% healthy controls; 91.2 % adolescents with a depression) and parents (94.6% parents of healthy controls; 82.8% parents of adolescents with a depression) were born in the Netherlands. For detailed information on sample recruitment and study procedure see Appendix 2.

EMA

All participants received four questionnaires a day (56 in total) on their own smartphone using the Ethica app for 14 consecutive days and were instructed to complete the questionnaires as quickly as possible. Questionnaires were triggered between 7AM and 9.30PM on weekdays and 9AM and

9.30PM on weekend days according to a standardized trigger schedule (see for detailed information Appendix 3 and full codebook of the EMA of RE-PAIR https://osf.io/dcemq/). The EMA of RE-PAIR was conducted in the period between September 2018 and March 2022. As compensation for EMA, parents received €20,-. Healthy controls received €10,- and adolescents with a depression did not receive compensation for the EMA since it was incorporated in their treatment. In addition, six gift vouchers of €75,- were raffled based on compliance.

Compliance

With regard to the healthy controls, adolescents fully completed 2930 (68.3%) of the delivered questionnaires. In 1426 cases (48.7% of answered questionnaires), adolescents indicated that they had interacted with one or both parents who participated in the EMA of RE-PAIR (*M* = 18.1 parent-adolescent interactions per participant, Range = 3-42). Parents fully completed 6582 (80.5%) of the delivered questionnaires.

With regard to adolescents with a depression, adolescents fully completed 1193 (63.8%) of the delivered questionnaires. In 554 cases (46.4% of answered questionnaires), adolescents indicated that they had interacted with one or both parents who participated in the EMA of RE-PAIR (*M* = 16.3 parent-adolescent interactions per participant, Range = 2-33). This did not differ significantly from healthy controls (*p* = .334). Parents fully completed 2329 (72.8%) of the delivered questionnaires. No participants were excluded based on missing data and all completed EMA data was retained for analyses.

Measures

Momentary positive and negative affect

Adolescents rated their momentary affect using an adapted and shortened four-item version of the Positive and Negative Affect Schedule for Children (PANAS-C; Ebesutani et al., 2012; Watson et al., 1988). Two positive affect states (happy and relaxed) and two negative affect states (sad and irritated) were assessed by asking “How do you feel at this moment?” followed by: “Happy”, “Relaxed”, “Sad”, and “Irritated”. Answers were given on a 7-point Likert type scale with answer categories ranging from 1 (*not at all*) to 7 (*very*). See Appendix 4 for within-person and between-person correlations of items. An average score of happy and relaxed was calculated to indicate for momentary positive affect. An average score of sad and irritated was calculated to indicate momentary negative affect.

Pleasantness of interaction

Adolescents indicated with whom they spoke to or with last since the previous beep. If they answered to have spoken to or with parent(s) last, follow-up questions were presented on pleasantness of interaction, affect, and parenting behavior. Adolescents answered the question “How was this contact?” on a 7-point Likert type scale with answer categories ranging from 1 (*very annoying*) to 7 (*very nice*).

Momentary positive and negative affect during parent-adolescent interaction

Adolescents rated their momentary affect during the interaction with an adapted and shortened five-item version of the Positive and Negative Affect Schedule for Children (PANAS-C; Ebesutani et al.,

2012; Watson et al., 1988). Two positive affect states (happy and relaxed) and three negative affect states (sad, irritated, and guilty) were assessed by asking "How did you feel during this contact?" followed by: "Happy", "Relaxed", "Sad", "Irritated", and "Guilty". Guilt, often part of or accompanying adolescent depression (Beck, 1967), was only assessed after interactions since parents and parenting can induce guilt during interactions (Sheeber et al., 2001). Answers were given on a 7-point Likert type scale with answer categories ranging from 1 (*not at all*) to 7 (*very*). For the current study, only answers about interactions with parents who participated in the EMA were included. See Appendix 4 for within-person and between-person correlations of items. An average score of happy and relaxed was calculated to indicate positive affect during the interaction. An average score of sad, irritated, and guilty was calculated to indicate negative affect during the interaction.

Parenting during parent-adolescent interaction

Adolescents rated parenting behavior during the interaction by answering the questions "How well did your mother/father listen to you?", "How well did your mother/father understand you?", "How critical was your mother/father towards you?", and "How dominant was your mother/father?". Answers were given on a 7-point Likert type scale with answer categories ranging from 1 (*not at all*) to 7 (*very*).

Similarly, if parents indicated that they spoke last to or with their adolescent since the last beep, they rated their own parenting behavior during the interaction. They answered the questions "How well did you listen to your child", "How well did you understand your child?", "How critical were you towards your child?", and "How dominant were you towards your child?". Answers were given on a 7-point Likert type scale with answer categories ranging from 1 (*not at all*) to 7 (*very*). Two subscales were created for parents and adolescents separately, parental warmth and parental criticism. See Appendix 4 for within-person and between-person correlations of items. An average score of listening and understanding behavior during the interaction was calculated to assess parental warmth. An average score of critical and dominant behavior during the interaction was calculated to assess parental criticism.

Depressive symptoms

The Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001) was used to assess depressive symptoms in the previous two weeks as part of the online questionnaires adolescents had to complete before the research day in the lab. The items are based on nine DSM-IV criteria for depression and are rated as 0 (*not at all)* to 3 (*nearly every day*). One item (item 8; moving or speaking slowly or being so fidgety or restless) was split in two items and the maximum score of these two items was included. Sum scores range from 0 to 27 and a score above 10 is suggestive of the presence of depression (Manea et al., 2012). Cronbach alpha was .94.

Preregistered analyses

Our analysis plan including power analyses was preregistered online (https://osf.io/qjyp5/?view_only=2d50bab7b908401798ae7694f26faeb0). As the amount of observations of interactions of adolescents with fathers was less than expected, we performed some sensitivity checks (see Appendix 5). For the analyses we used R version 4.0.1 (R Core Team, 2020) and

for the multilevel models multilevel package version 2.6 (Bliese, 2016) with ML estimation. Level 1 predictors were person-mean centered, following guidelines proposed by (Hoffman, 2015) and (Bolger & Laurenceau, 2013).

To account for the nestedness of the data (i.e., measurements nested in individuals) we used multiple multilevel models. To examine whether adolescent momentary positive and negative affect (in general and during parent-adolescent interactions) and momentary parental warmth and criticism during parent-adolescent interactions differed between families with an adolescent with a depression and healthy controls (aim 1) we tested eight models including adolescents' reports and four including parents' reports. To investigate the within-person association between perceived parenting behavior and adolescent affect during parent-adolescent interactions (aim 2), we added the person-mean centered scores of perceived maternal warmth, perceived maternal criticism, perceived paternal warmth, and perceived paternal criticism to the unconditional random intercept models of positive and negative affect separate (eight models). Next, in each model, variation was allowed around the slope to examine heterogeneity. Likelihood ratio tests were used to assess differences in fit of the models (following guidelines of (Hox et al., 2017). To assess whether the association between parenting and adolescent affect during parent-adolescent interactions was stronger for adolescents with a depression (aim 3), we added the binary variable clinical status (0 = healthy controls, 1 = adolescents with a depression) to the model as main effect and in interaction with perceived parenting. Lastly, we explored whether the association between parenting and adolescent affect during parent-adolescent interactions was stronger for adolescents with more depressive symptoms. This level 2 predictor was grand-mean centered.

Correlation structure corCAR1 was added in all models to take into account unequally spaced time intervals (Singer et al., 2003).

Results

Descriptive analyses

Table 1 provides information on parent-adolescent dynamics. Adolescents with a depression reported higher levels of emotional abuse and neglect during their childhood compared to healthy controls (p's < .001), and less care and more overprotection from mothers and fathers as well as a less secure attachment with mothers and fathers (p's < .01). On a daily level (assessed at the end of the day), adolescents with a depression reported lower levels of perceived parental warmth of mothers and fathers than healthy controls (p's < .05), whereas levels of perceived criticism did not significantly differ. Parents of adolescents with a depression also reported less care and more overprotection, but additionally perceived themselves as more autonomy granting compared to parents of healthy controls (p's < .05). Parents' self-reported daily parental warmth and criticism (assessed at the end of the day) did not significantly differ between the two groups of parents.

Table 1. Sample demographics and descriptive statistics.

		CON		DEP	Difference[a]
	N/obs		*N/obs*		*p*
Adolescents					
Sex, % Female, (*n*)	79	63.3 (50)	34	76.5 (26)	
Age (years), *M (SD)*	79	15.9 (1.33)	34	15.7 (1.53)	
Highest level of education, % (*n*)	79		34		
Vocational education		12.7 (10)		17.6 (6)	
Advanced secondary education		32.9 (26)		23.5 (8)	
Pre-university education		45.6 (36)		38.2 (13)	
Secondary vocational education		6.3 (5)		14.7 (5)	
Higher professional education		2.5 (2)		5.9 (2)	
Depressive symptoms (PHQ-9) *M* (SD)	79	4.77 (2.81)	34	20.21 (4.56)	< .001
CTQ					
Emotional abuse *M* (SD)	78	6.44 (2.27)	34	8.68 (3.72)	< .001
Emotional neglect *M* (SD)	78	7.94 (2.98)	34	10.94 (3.46)	< .001
PBI					
Care – mother *M* (SD)	78	31.91 (4.21)	34	27.03 (6.68)	< .001
Overprotection – mother *M* (SD)	78	3.51 (2.28)	34	5.88 (3.52)	< .001
Autonomy – mother *M* (SD)	78	3.59 (2.87)	34	4.71 (4.37)	.362
Care – father *M* (SD)	70	29.99 (5.17)	25	26.16 (6.10)	.004
Overprotection – father *M* (SD)	70	3.06 (2.33)	25	5.32 (3.48)	< .001
Autonomy – father *M* (SD)	70	3.59 (2.55)	25	4.92 (3.65)	.141
IPPA					
Attachment – mother *M* (SD)	78	42.45 (4.62)	34	36.29 (6.72)	< .001
Attachment – father *M* (SD)	70	39.03 (5.82)	25	33.84 (6.20)	< .001
Daily level					
Daily maternal warmth *M* (SD)	844	5.90 (1.04)	351	5.42 (1.47)	.007
Daily maternal criticism *M* (SD)	844	2.01 (1.32)	351	1.97 (1.27)	.698
Daily paternal warmth *M* (SD)	730	5.79 (1.20)	236	5.35 (1.44)	.030
Daily paternal criticism *M* (SD)	730	1.83 (1.27)	236	1.90 (1.26)	.755
Parents					
Sex, % Female, (*n*)	149	52.3 (78)	58	58.6 (34)	
Age (years), *M (SD)*[a]	149	49.2 (5.73)	58	50.1 (5.30)	
Highest level of education, % (*n*)	149		58		
No diploma		0.7 (1)		1.7 (1)	

Lower vocational education		6.7 (10)		17.2 (10)	
Intermediate vocational education		25.5 (38)		24.1 (14)	
Higher vocational education or scientific education (university)		67.1 (100)		56.9 (33)	
PBI	149		58		
Care *M* (SD)		31.37 (4.02)		29.47 (4.28)	.002
Overprotection *M* (SD)		3.93 (2.49)		5.24 (2.89)	.003
Autonomy *M* (SD)		3.92 (2.50)		4.91 (2.50)	.011
Daily level					
Daily maternal warmth *M* (SD)	948	5.70 (0.94)	406	5.73 (1.05)	.687
Daily maternal criticism *M* (SD)	948	2.44 (1.43)	406	2.39 (1.34)	.736
Daily paternal warmth *M* (SD)	785	5.38 (0.98)	252	5.40 (0.97)	.632
Daily paternal criticism *M* (SD)	785	2.46 (1.40)	252	2.55 (1.46)	.890

[a]Difference was tested by using appropriate non-parametric tests. To test differences on the daily level, we specified multilevel models.

PHQ-9 = Patient Health Questionnaire-9; CTQ = Childhood Trauma Questionnaire; PBI = Parental Bonding Inventory; IPPA = Inventory of Parent and Peer Attachment. See Appendix 4 for detailed explanation and psychometric properties of the measures in this table.

Main analyses

Descriptive statistics of the study variables and results of multilevel models are presented in Table 2, correlations can be found in Appendix 6. Adolescents with a depression reported significantly less momentary positive and more negative affect than healthy controls (*p'*s < .001, see Figure 1). With respect to the parent-adolescent interactions, overall, adolescents with a depression experienced the interactions with their parents to be less pleasant compared to healthy controls (DEP (552): *M* = 4.77, *SD* = 1.29; HC (1425): *M* = 5.57, *SD* = 1.21, *p* < .001). The majority of these interactions were face-to-face (97.9%) (rather than online or via a phone call). During parent-adolescent interactions, adolescents with a depression reported significantly less positive and more negative affect than healthy controls (*p*'s < .001). Adolescents with a depression did not differ from healthy controls in their perceptions of perceived parental warmth and parental criticism of mothers and fathers during parent-adolescent interactions (all *p*'s > .050). Similarly, mothers' and fathers' own perception of parental warmth and criticism did not differ between parents of adolescents with a depression and healthy controls (all *p*'s > .050, see Figure 2).

Table 2. Descriptive statistics of study variables and results of multilevel models to test differences between groups.

	HC		DEP		Difference[a]
	Obs	*M* (SD)	*Obs*	*M* (SD)	*Estimate* (*p*)
Adolescents					
Positive affect	2947	5.47 (1.13)	1212	3.77 (1.53)	-1.694 (< .001)
Negative affect	2946	1.47 (0.91)	1210	3.20 (1.54)	1.710 (< .001)
Positive affect during parent-adolescent interaction	1425	5.57 (1.15)	552	4.09 (1.40)	-1.483 (< .001)
Negative affect during parent-adolescent interaction	1425	1.33 (0.67)	551	2.50 (1.19)	1.183 (< .001)
Maternal warmth during parent-adolescent interaction	1053	5.79 (1.19)	438	5.47 (1.23)	-0.348 (.062)
Maternal criticism during parent-adolescent interaction	1053	1.74 (1.14)	438	2.01 (1.35)	0.289 (.118)
Paternal warmth during parent-adolescent interaction	624	5.79 (1.21)	194	5.72 (1.36)	-0.160 (.496)
Paternal criticism during parent-adolescent interaction	624	1.69 (1.09)	194	1.86 (1.29)	0.194 (.350)
Parents					
Maternal warmth during parent-adolescent interaction	798	5.75 (1.03)	446	5.64 (1.15)	0.002 (.991)
Maternal criticism during parent-adolescent interaction	798	2.10 (1.40)	445	2.21 (1.28)	0.081 (.658)
Paternal warmth during parent-adolescent interaction	449	5.65 (0.91)	163	5.26 (1.17)	-0.193 (.267)
Paternal criticism during parent-adolescent interaction	449	2.29 (1.30)	163	2.36 (1.35)	-0.002 (.993)

Note. Healthy controls (*n* = 79) and their parents (*n* = 149), adolescents with a depression (*n* = 34) and their parents (*n* = 58).

[a]Difference refers to results of multilevel model in which clinical status was entered as the predictor.

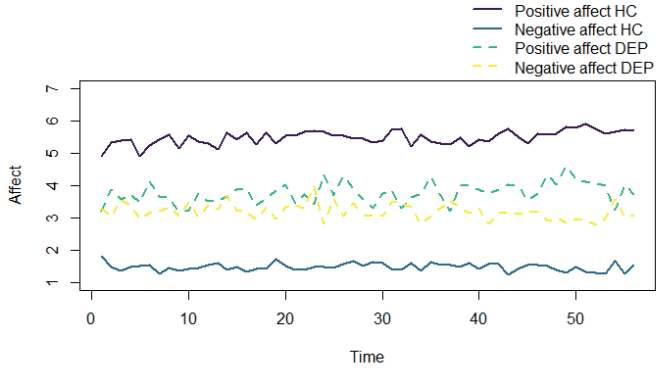

Figure 1. Average fluctuations of momentary positive and negative affect of adolescents over time per group (HC = healthy controls, DEP = adolescents with a depression).

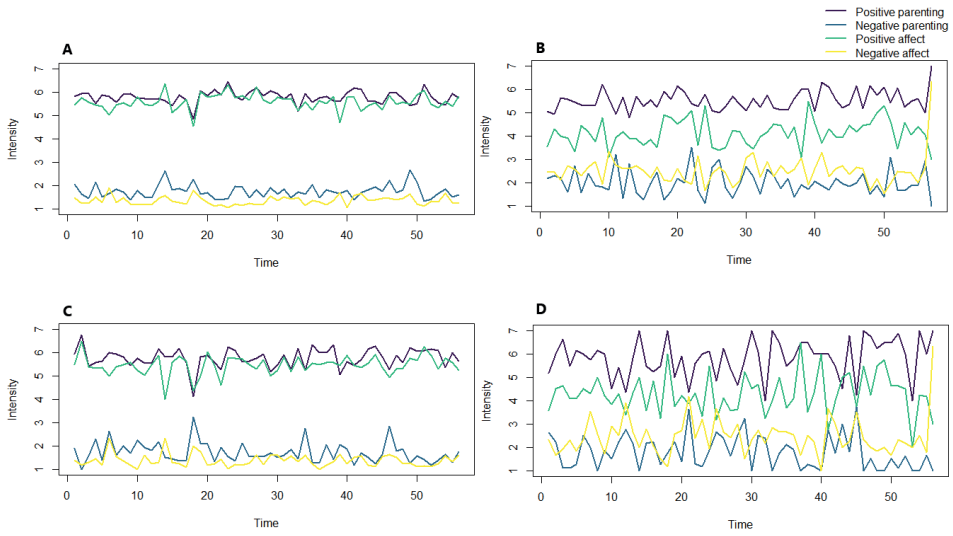

Figure 2. Average fluctuations of momentary adolescent affect and perceived parenting during parent-adolescent interactions per group over time (observations). Panel A and B represent interactions with mothers reported by HC adolescents and DEP adolescents respectively. Panel C and D represent interactions with fathers reported by HC adolescents and DEP adolescents respectively.

As indicated by the intraclass correlations (ICC) 57.4% of the variance in adolescent negative affect and 60.8% of the variance in adolescent positive affect was due to differences between adolescents, and 42.6% and 39.2% due to within-person fluctuations over time. Examination of the within-person association between perceived parenting behavior and affect during momentary parent-adolescent interactions (aim 2) showed that when adolescents perceived their mothers and fathers to show more warmth or less criticism during interactions, they also reported more positive and less negative affect (all *p*'s < .001, see Appendix 7). Next, we allowed variation around the slope of perceived parenting in each model and likelihood ratio tests indicated that this improved the model fits significantly (all *p*'s < .001), This indicates that adolescents differed substantially in the extent to which perceived parental warmth and criticism of mothers and fathers were associated with positive and negative affect.

To examine whether the association between perceived parenting and adolescent affect during momentary parent-adolescent interactions differed between adolescents with a depression and healthy controls (aim 3), we added clinical status (being diagnosed with a depression or not) to the models as well as an interaction of clinical status with perceived parenting. Results are displayed in Table 3. In all models, there was no significant interaction between perceived parenting and clinical status, indicating that the link between perceived parenting and adolescent affect did not differ between adolescents with a depression and healthy controls (see Appendix 8 for figures). Adolescents with a depression did report less positive affect and more negative affect during parent-adolescent interactions than healthy controls. Further inspection of these associations in adolescents with a depression indicated that even within this group, there are individual differences in how parenting and adolescent affect are related. An example is illustrated in Figure 3.

We furthermore explored whether the association between parenting and adolescent affect during parent-adolescent interactions differed based on severity of depressive symptoms instead of the clinical status. Findings were very similar compared to clinical status and indicated that the link between perceived parenting and adolescent affect during parent-adolescent interactions did not differ between adolescents based on the severity of depressive symptoms. Full model results are presented in Appendix 9.

Sensitivity analyses

In addition to our preregistered analyses, we conducted one post hoc sensitivity analysis to elucidate whether the association between perceived parenting and adolescent affect during parent-adolescent interactions differed between boys and girls. We included perceived parenting, clinical status (as main effect), sex, and an interaction between sex and perceived parenting in the models. The interaction between sex and perceived parenting was not significant, indicating that the link between perceived parenting and adolescent affect did not differ between boys and girls (see Appendix 10 for full model results). Sex itself was also not significantly related to adolescent positive and negative affect in the models including maternal warmth and criticism. However, when inspecting the models focusing on the interactions between adolescents and fathers, adolescent girls reported less positive and more negative affect than boys during interactions with their fathers (all p's < .050).

Table 3. Parental warmth and criticism and adolescent positive and negative affect during parent-adolescent interactions and the moderating role of depression.

	Adolescent positive affect			
	Parental warmth mothers	Parental warmth fathers	Parental criticism mothers	Parental criticism fathers
Fixed effects: estimate *(SE)*				
Intercept	5.457*** (0.102)	5.463*** (0.120)	5.460 *** (0.102)	5.465*** (0.120)
Perceived parenting	0.441*** (0.049)	0.447*** (0.061)	-0.280*** (0.049)	-0.351*** (0.069)
Clinical status	-1.436*** (0.186)	-1.472*** (0.238)	-1.434*** (0.186)	-1.472*** (0.238)
Perceived parenting*clinical status	-0.072 (0.087)	0.008 (0.121)	0.037 (0.085)	0.045 (0.140)
Random effects				
Between person variance	0.726	0.866	0.714	0.856
Within person variance	0.644	0.495	0.724	0.559
Random effect variance	0.076	0.103	0.065	0.118
	Adolescent negative affect			
	Parental warmth mothers	Parental warmth fathers	Parental criticism mothers	Parental criticism fathers
Fixed effects: estimate *(SE)*				
Intercept	1.413*** (0.077)	1.425*** (0.080)	1.414*** (0.077)	1.426*** (0.080)
Perceived parenting	-0.225*** (0.035)	-0.183*** (0.046)	0.257*** (0.036)	0.239*** (0.042)
Clinical status	1.155*** (0.140)	1.165*** (0.158)	1.154*** (0.141)	1.166*** (0.159)
Perceived parenting*clinical status	-0.076 (0.061)	-0.027 (0.091)	0.033 (0.064)	0.151 (0.084)
Random effects				
Between person variance	0.407	0.366	0.418	0.378
Within person variance	0.359	0.288	0.333	0.276
Random effect variance	0.036	0.059	0.043	0.035

Note. Models concerning adolescent-mother interactions *N* individuals = 112, *N* observations = 1491. Models concerning adolescent-father interactions *N* individuals = 90, *N* observations = 818.

*$p < .05$. **$p < .01$. ***$p < .001$.

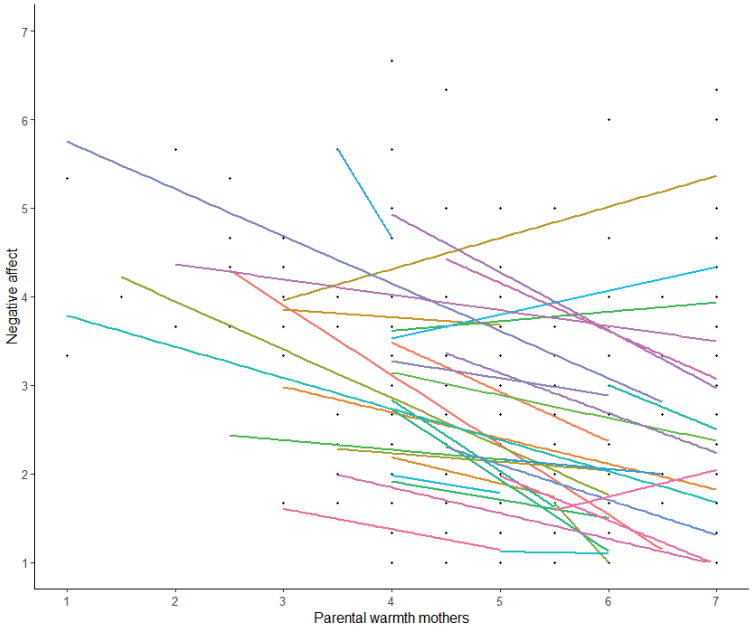

Figure 3. Individual-level associations between parental warmth of mothers and negative affect during momentary parent-adolescent interactions for adolescents with a depression. Each line represents one person.

Discussion

Insights into the daily life processes in families with an adolescent with a depression may generate valuable information for clinical practice. This study on the moment-to-moment experiences of adolescent affect and parenting during parent-adolescent interactions in a clinical sample of families with depressed adolescents indicate that adolescents with a depression experience lower levels of positive affect and higher levels of negative affect than healthy controls throughout the days as well as during parent-adolescent interactions, with differences being substantial. This is in line with our preregistered hypotheses and previous research (Silk et al., 2007; Silk et al., 2011), even though some EMA studies did not find differences in affect between depressed and non-depressed adolescents (Cousins et al., 2011; Doane et al., 2013; Mor et al., 2010). As illustrated in Figure 1, on average adolescents with a depression reported little below the middle of the scale (ranging from not at all to very) which may indicate a more flat or blunted affect. This seems to be partly in line with the Emotion Context Sensitivity theory that proposes that depression flattens emotions in general (Rottenberg, 2005).

Momentary levels of reported parental warmth and criticism during parent-adolescent interactions did not differ between the two groups, not from the perspective of the adolescent nor from the parent (i.e., mother and father). Interestingly, this deviates from our hypotheses and our other findings that adolescents with a depression perceive their relationship with mothers and fathers as more negative (e.g., less care and more overprotection) as indicated on the retrospective questionnaires compared to healthy controls. Parents of adolescents with a depression themselves

also reported less parental care and more overprotection on the retrospective questionnaires than parents of healthy controls. These discrepancies are intriguing, with the retrospective reports being in line with previous findings based on retrospective questionnaires (and observations in the lab) that also indicate that parent-adolescent interactions in families with adolescents with a depression are less supportive and more conflictual (e.g., Chapman et al., 2016; Sheeber et al., 2007) and lower in parental care (Kullberg et al., 2020; Valiente et al., 2014). This indicates that findings on one timescale do not necessarily apply to another (Keijsers & Van Roekel, 2018). Cognitive biases may play a role here: when adolescents are asked to report retrospectively on parenting, their memories may be negatively biased by their mood (Platt et al., 2017), while these biases may be reduced when using EMA to assess parenting at the momentary level, without a delay.

Our findings also indicate the importance of parenting for adolescent's well-being, also for depressed adolescents. When adolescents perceived their parents as more warm or less critical during interactions they also reported more positive and less negative affect, supporting previous findings in community samples at the momentary (Bülow et al., 2022) or daily level (Janssen et al., 2021; Timmons & Margolin, 2015). The momentary associations between parenting and affect in the current study did not differ between adolescents with and without a depression and was not associated with levels of depressive symptoms either. A recent study on parenting and affect during momentary parent-adolescent interactions, based on a community sample, reported similar results (Bülow et al., 2022). However, previous work in community samples did show that daily linkages between parenting and adolescent affect were stronger for adolescents with more depressive symptoms (Janssen et al., 2021; Timmons & Margolin, 2015). The abovementioned biases may play a role here as daily reports of parenting still involve some recollection, including the inherent biases, while these do not apply to momentary assessments.

Another important finding is that we found substantial variation between adolescents, indicating that the strength or direction of how warm or critical parenting is associated to adolescent affect differs between adolescents. Even within our sample of adolescents with a depression, this heterogeneity was observed. This aligns with previous findings that even siblings differ in patterns of parental bonding, and how this links to symptoms depression and anxiety, depending on their personality (i.e., locus of control and extraversion) (Kullberg et al., 2021). Studies using more person-centered and idiographic approaches are needed (Molenaar, 2004) to better understand these factors and translate them into implications for clinical practice.

A unique feature of the current study was that we assessed parental warmth and criticism of mothers and fathers separately. Despite family system theories proposing adolescent-mother and adolescent-father dyads being distinct subsystems (Cox & Paley, 1997; Restifo & Bögels, 2009) and suggestions that parenting roles of mothers and fathers may differ (e.g., Lamb & Lewis, 2013), not many studies have assessed parenting of both mothers and fathers. Our results suggest that perceived parental warmth and criticism of mothers *and* fathers are important for adolescent well-being. Interestingly, sensitivity analyses (in the supplementary materials) indicated that adolescents reported more positive affect when interacting with mothers and fathers at the same time compared to with fathers only. Moreover, girls reported more negative and less positive affect in interactions with fathers than boys. These findings highlight the need to assess family dynamics of mothers, fathers, and adolescents together, as well as taking into account sex of adolescents.

Taken together, a major strength of the current study is that momentary parent-adolescent interactions were monitored in a clinical sample of families with an adolescent with a depression and that we included not only adolescents' perceptions of parenting of mothers and fathers separately but also parents' own perceptions. This provided a unique insight into the everyday experiences of these families. Additionally, it allowed for linking perceived parental warmth and criticism of both mothers and fathers separately to adolescent affect, providing more insight into potential distinct influences of mothers and fathers during momentary parent-adolescent interactions.

These results also provide first insights into the momentary experiences of families with adolescents with a depression that are also relevant for clinical practice. Since adolescents with a depression do seem to benefit from parental warmth in daily life, and also report more negative on parenting in retrospective reports, which is in turn associated with more negative affect, interventions on adolescent depression may benefit from the involvement of parents, both mothers and fathers. A recent meta-analysis has shown that the involvement of parents in treatment can increase the efficacy of individual CBT (Oud et al., 2019). These family interventions could include psychoeducation to inform parents about how adolescents depression and cognitive biases influence adolescents' experiences of daily life, and foster a warm family climate, limiting parental rejection, and criticism. Moreover, given the substantial variation in how parenting and adolescent affect is related and previous findings that perceptions of adolescents and parents differ (Hou et al., 2020; Korelitz & Garber, 2016), exploring the needs of the adolescent in treatment and discussing them with parents also seems an important ingredient. This could yield more understanding of each other's perception and behavior as well as aligning what adolescents need or want and what parents can provide.

Some limitations should also be acknowledged that may provide directions for future studies. The sample of the study was fairly homogenous with regard to ethnic and educational background, with the majority of adolescents and parents being born in the Netherlands. Furthermore, our sample of families with an adolescent with a depression might be biased. Families who decided to participate in the study, focusing on parent-adolescent interactions and adolescent mental well-being, may not be families with harsh or neglecting parenting behavior, thereby resulting in an underestimation of negative parent-adolescent interactions. Although future studies may therefore strive to include a more diverse, representative sample of depressed adolescents, including families with a depression is very challenging. Moreover, although we were able to assess experiences of parent-adolescent interactions in their natural context due to the use of EMA, it may also have resulted in collecting data of interactions about mundane matters (e.g., who is unloading the dishwasher) that do not have a large impact on adolescents' affect. Future studies may benefit from gaining more information about the *content* of the interactions (i.e., topics that have been discussed). Lastly, as we focused on concurrent associations during momentary parent-adolescent interactions, due to limited power, no claims can be made about the direction of effects. Future work assessing the direction of effects could result in more specific implications for clinical practice.

Conclusion

Parenting has been consistently associated with adolescent depression, but most research to date has used retrospective questionnaires concerning macro-time intervals. To inform clinical practice, it important to investigate whether these findings represent actual moment-to-moment experiences in daily life. With the use of EMA and inclusion of families with an adolescent with a depression, we showed that adolescents with a depression overall reported more negative and less positive affect than healthy controls. Generally, perceived parental warmth and criticism and affect during parent-adolescent interactions co-fluctuated. This association did not differ between adolescents with a depression and healthy controls, even though adolescents with depression and their parents did indicate more negative parenting (e.g., less care and more overprotection) in the retrospective questionnaires. These findings indicate that these adolescents generally do seem to benefit from parental warmth, while the discrepant findings also support the idea that a negativity bias may have affected the retrospective reports of parenting. Clinicians should facilitate the communication of needs and perspectives between adolescents and parents. The study further supports the idea that the extent to which parenting processes relate to adolescent affect differs per family and therefore calls for a more person-centered and idiographic approach in research to guide family interventions.

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