Blue kaleidoscope: disentangling family perspectives in the context of adolescent depression

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Chapter 4 | Balancing boundaries: Observed parental autonomy support and psychological control in the context of parent-adolescent interactions and adolescent depression

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Abstract

Autonomy support (AS) and psychological control (PC) are important parenting behaviors in adolescence, with low AS and high PC relating to adolescent depression. Studies on observed levels of AS and PC in a clinical sample are lacking. The current study aimed to (1) develop a reliable coding system for parental AS and PC in parent-adolescent interactions and gain insights into its ecological validity in a healthy control (HC) sample, and (2) disentangle observed and adolescent-perceived parenting behaviors in relation to adolescent depression. HC adolescents (N = 80, Mage = 15.90, 63.7% girls, 91.3% White) and their parents (N = 148, Mage = 49.00, 53.4% female, 97.3% White) and adolescents with depression (current MDD/dysthymia; N = 35, Mage = 15.60, 77.1% girls, 65.7% White) and their parents (N = 62, Mage = 50.13, 56.5% female, 79.0% White) participated in three videotaped dyadic interaction tasks (problem solving, event planning, and reminiscence). Adolescents reported on their parents' behavior and their own positive and negative affect after each task, while observed AS and PC were coded from the videos. Multilevel analyses showed that observed AS and PC, coded with our reliable system, related to adolescent-perceived parenting (in daily life), confirming ecological validity. Adolescents with depression (vs. HC) had more negative perceptions of parenting, whereas observed AS and PC did not differ, indicating a negativity bias of adolescents with depression. Lastly, observed PC related to a lower affective state in adolescents with depression, but not HC. Parents could be psycho-educated on the impact of this behavior in a clinical setting.

Keywords: Adolescent depression, Observed and perceived parenting, Parental autonomy support and psychological control

Introduction

Humans develop from a state of full dependency on available caregivers in infancy to autonomous individuals over the course of decades (McCurdy et al., 2020). Following the self-determination theory, autonomy can be defined as the need for independent and purposeful functioning out of intrinsic motivation. It is considered to be one of the basic psychological needs for optimal human development (Ryan & Deci, 2000) and a central developmental task in adolescence (McCurdy et al., 2020; Smetana, 2010). The development of autonomy does not occur in isolation; parental autonomy support is of profound importance across the full span of child development (Vasquez et al., 2016), with different nuances depending on the developmental phase (McCurdy et al., 2020). Specifically during adolescence, parental autonomy support should encourage the adolescent's self-endorsed decision-making in which the adolescent can align their own actions and value-systems (McCurdy et al., 2020). Autonomy supportive behavior is characterized by parents showing structure (i.e., (non)verbal encouragements and patience) and support (i.e., actively accepting of and further exploration of adolescent's input) towards their child's communication, emotions, cognitions, and decision-making. Importantly, autonomy supportive behavior does not mean that parents do not set any boundaries, but that they do so by clearly and respectfully explaining why they make certain decisions (Deci & Ryan, 2000; McCurdy et al., 2020; Soenens & Vansteenkiste, 2010). Empirical studies show that parental autonomy support positively relates to adolescents' autonomous functioning and broader mental health (meta-analysis by Vasquez et al., 2016).

In contrast to autonomy support, parental psychological control can be detrimental to development of autonomy. The focus of psychological control lies with parents' attempts to force their child into a parent-directed perspective. The concepts of autonomy support and psychological control are clearly related, but not mutually exclusive, and therefore reflect separate constructs rather than two ends of the same continuum (Barber et al., 2005; Hauser Kunz & Grych, 2013). Psychologically controlling behavior is characterized by the use of controlling and manipulative tactics (e.g., constraining expressions, guilt induction, invalidation of feelings) that are intrusive towards the child's feelings and thoughts (Barber et al., 2005; Deci & Ryan, 2000; Soenens & Vansteenkiste, 2010). Empirical studies show that parental psychological control negatively relates to adolescents' autonomous functioning and broader mental health (Chyung et al., 2022; Costa et al., 2016; Hare et al., 2015; Yan et al., 2020).

While research highlights the importance of parental autonomy support and psychological control, virtually all studies rely on child/adolescent reports (McCurdy et al., 2020; Vasquez et al., 2016; Yan et al., 2020) and little is known about the relation of observed parental autonomy support and psychological control with adolescent well-being. There is a need for a coding system for

observed autonomy support and psychological control that can be used in parent-adolescent interaction research, to disentangle observed behaviors from adolescents' perceptions. Three studies included observed parental autonomy support (Wuyts et al., 2018), psychological control (Barber, 1996), and autonomy *granting* and psychological control (Hauser Kunz & Grych, 2013). However, none of these studies included measures of observed autonomy support and psychological control (see Measures). In the current study, we aim to develop a reliable coding system for observed parental autonomy support and psychological control in parent-adolescent interactions, and gain insights into its ecological validity in families with an adolescent without psychopathology (i.e., healthy control; HC). Ultimately, we aim to provide a coding system that can be used in parent-adolescent interaction research.

To gain insights into the ecological validity of assessing observed autonomy support and psychological control in the lab setting, we will test whether observed autonomy support and psychological control relate to adolescents' experiences of parenting behaviors (1) in the same interaction and (2) in daily life context. To the best of our knowledge, there are no studies that included (any type of) observed parenting behaviors as well as adolescents' experiences during the same parent–child interaction. However, the study by Wuyts et al. (2018) shows there is a small, albeit significant, correlation between observed and overall adolescent-perceived autonomy support. A pioneering study using Ecological Momentary Assessment (EMA; also known as Experience Sampling Method) showed that observed parental affect in the lab while interacting with their child, relates to adolescents' perceptions of parental affect in daily life (Griffith et al., 2018). Based on these studies, we expect observed autonomy support and psychological control to relate to some extent to adolescent-perceived parenting behaviors in the lab and in daily life. In the current study (that is part of a larger research project, see Participants) we used adolescent reports about their parents' listening and understanding to indicate parental autonomy support, and adolescent reports about their parents' dominance and criticism to indicate parental psychological control. With regards to autonomy support, the receptive aspects are covered by asking about listening, and stimulation of adolescents' input is at least partly covered by asking about understanding (though explaining motivations and asking in-depth follow-up questions are not explicitly covered). With regards to psychological control, the constraining, invalidating, and criticizing aspects are largely covered by asking about criticism and dominance. However, guilt induction is not covered with these questions, this concept is difficult to assess with a brief questionnaire about parenting in between interaction tasks.

We will further examine observed autonomy support and psychological control in relation to adolescents' affect during the interaction with their parent. Previous studies using EMA show that adolescent-perceived autonomy support and psychological control (van der Kaap-Deeder et al., 2023) and other parenting behaviors (e.g., Bülow et al., 2022; Griffith et al., 2018; Griffith & Hankin, 2021;

Janssen et al., 2021; Richmond et al., 2013) relate to adolescent affective state in daily life. However, so far, there are no studies linking observed parenting behaviors to adolescent affective state in the lab. The current study will thus add to existing research by linking observed autonomy support and psychological control in the lab to the adolescents' experiences of parenting behavior (in daily life) and to adolescent affect.

The coding system for observed autonomy support and psychological control is used in three dyadic parent-adolescent interaction tasks (problem solving, event planning, and reminiscence task; see Procedure) to simulate common communication topics between parents and adolescents in daily life. Previous studies showed the importance of context, with more negative observed parenting behaviors in a more challenging (i.e., demanding, stressful) context (Branger et al., 2019; Grolnick et al., 2002; McCurdy et al., 2020). In the current study we will test whether observed and adolescent-perceived parenting behaviors are more negative in a more challenging context (i.e., problem solving vs. event planning and reminiscence task). The impact of the context on adolescent-perceived, in addition to observed, parenting behaviors is included to understand whether the context similarly matters for these different perspectives. We will thereby gain insights into the behavior that is elicited (and perceived) by the specific tasks, which can help researchers and clinicians choose the task most relevant to their aim.

Parental Autonomy Support and Psychological Control in the Context of Adolescent Depression

Parental autonomy support and psychological control relate to adolescent mental health in general (Chyung et al., 2022; Vasquez et al., 2016; Yan et al., 2020), but may be particularly relevant in the context of adolescent depression. The prevalence of (clinical) depression increases during adolescence (Lewinsohn et al., 1998; Ormel et al., 2015; Solmi et al., 2022). Adolescent depression is characterized by irritability and negative self-perceptions (Crowe et al., 2006; Nardi et al., 2013; Orchard et al., 2017; Parker & Roy, 2001), and accompanied by cognitive and somatic symptoms (APA, 2013). Symptoms can substantially impair adolescents in the social, academic, and/or family domain (Clayborne et al., 2019). An adolescent with depression may struggle with negative thoughts about themselves and the world around them, and experience difficulties to get out of bed, go to school, and spend meaningful time with their family.

Empirical studies show that a lack of (perceived) parental autonomy support and the presence of (perceived) parental psychological control can precede, co-occur, and follow adolescent depression (Barber et al., 2005; Chyung et al., 2022; Costa et al., 2016; Gorostiaga et al., 2019; Van der Giessen et al., 2014), suggesting a bidirectional relation between these parental behaviors and adolescent depression. On one hand, a lack of autonomy support and high levels of psychological can precede and co-occur with adolescent depression, because of

the relevance of these parenting behaviors in adolescents' regulation of thoughts and feelings. Parental autonomy support can help adolescents to explore and deal with their own (negative) thoughts and feelings in (a trusting, supportive) relation with significant others in their life (Deci & Ryan, 2000). With negative thoughts and feelings at the center of depression, parental autonomy support may thereby be an important buffer. Contrary to autonomy support, parental psychological control has been considered a negative form of control that dysregulates adolescents' thoughts and feelings, diminishes their ability to establish emotional links with others, and to develop autonomous functioning and positive self-views (Barber, 1996; Ryan & Deci, 2000). On the other hand, a lack of autonomy support and high levels of psychological control may co-occur with and follow from adolescent depression, because of the manifestation of the disorder. Given the adolescent's negative thoughts and feelings and trouble with daily life, parents may be inclined to take over; to be overprotective towards their child in a controlling manner, thereby (unintentionally) communicating towards the adolescent they are lacking in competence for self-care and undermining in opportunities to develop healthy regulatory strategies (Elzinga et al., 2022; Vigdal & Brønnick, 2022).

So far, however, research on the relations of parental autonomy support and psychological control with adolescent depression is mainly based on adolescent reports of these constructs, and there are no studies yet that examined the link in a clinical sample. Adolescents with a clinical diagnosis of depression possibly experience their parents' behavior more negatively due to their own negative beliefs and may be less likely to recognize and benefit from support from others, and more likely to expect and receive rejection (Coyne, 1976; Hale et al., 2008; Platt et al., 2017; Roth & Assor, 2012). In the current study, we aim to disentangle observed and adolescent-perceived parenting behaviors in families with an adolescent with a current clinical depression as compared to HC families. This is of crucial importance given that perception and memory biases are well-known characteristics of depression (Everaert & Koster, 2020; Platt et al., 2017). Lastly, we will test whether the affective state of adolescents with depression is more strongly influenced by their parents' behavior (observed autonomy support and psychological control). By examining these questions, we ultimately aim to gain insights for clinicians treating adolescents with depression.

Current Study

The current study has two overall aims. The first overall aim is to develop a reliable coding system for parental autonomy support (AS) and psychological control (PC) in different contexts of parent-adolescent interactions, and gain insights into its ecological validity in a healthy control sample (HC families). More specifically, we will test the following hypotheses. In the more challenging problem solving task (vs. event planning and reminiscence), we expect observed parental AS to be lower and PC higher (1.1), and adolescents to report less parental listening/understanding (L/U) and more criticism/dominance (C/D) (1.2). We will

explore whether observed parental AS and PC relate to adolescent-perceived parental L/U and C/D and to adolescent affective state post-task (1.3), and to adolescent-perceived parental L/U and C/D in daily life (1.4).

The second overall aim is to disentangle observed and adolescent-perceived parenting behavior in relation to adolescent depression. More specifically we will test the following hypotheses: In families with an adolescent with a clinical depression (vs. HC), we expect observed parental AS to be lower and PC higher (2.1), and adolescent-reported parental L/U to be lower and C/D higher (2.2). Lastly, we will explore whether the relation of observed AS and PC with adolescent-perceived L/U and C/D, and with adolescent affective state is different for adolescents with depression (vs. HC) (2.3). Preregistered hypotheses can be found via https://osf.io/rcbqz/?view_only=646785272d2742baaf11e64d57a9a474.

Methods

Participants

The current study used data of the Dutch multi-method, multi-informant project 'Relations and Emotions in Parent-Adolescent Interaction Research' (RE-PAIR), in which the bidirectional relation between parent-adolescent interactions and adolescent depression is researched. A group of families (data collected between June 2018 and December 2019) with an adolescent without psychopathology (i.e., healthy controls, HC; *N* = 80) and their parents (*N* = 148), and a group of families (data collected between June 2018 and March 2022) with an adolescent with a current Major Depressive Disorder (MDD) or dysthymia (adolescents with depression; *N* = 35) and their parents (*N* = 62) were included in the RE-PAIR project. Sample characteristics are presented in Table 1. Of the adolescents with depression, 80.0% (*n* = 28) had a current MDD and 20.0% (*n* = 7) current dysthymia. Over half of the adolescents with depression had one or more comorbid disorder(s) (*n* = 22, 62.9%) with anxiety disorders being the most common (*n* = 19, 54.3%). Other comorbid disorders were attention deficit hyperactivity disorder, obsessive-compulsive disorder, and conduct disorder.

All adolescents were aged between 11 and 17 years at time of inclusion, willing to participate and living with at least one primary caregiver, and attending (or completed) high school or higher education. Adolescents as well as their parent(s) were required to have a sufficient command of the Dutch language. HC families were excluded if the adolescent had any psychopathology currently or in the past 2 years, had a lifetime depressive disorder, a history of psychological treatment, or used medication for psychological disorders or sleep medication. Families with an adolescent with depression were included if the adolescent had a current primary diagnosis of MDD or dysthymia. Families in this group were excluded if the adolescent used unstable doses of antidepressants, if safety could not be ensured because of suicidal tendencies (suicidal ideation per se was no exclusion criterion) or severe auto-mutilation, or in case of current comorbid intellectual

disability, psychosis, eating disorders, substance use disorders, and autism spectrum disorders. The Kiddie-Schedule for Affective Disorders and Schizophrenia – Present and Lifetime (K-SADS-PL; Reichart et al., 2000) (Supplementary Methods) was used to verify in-and exclusion criteria in both subsamples.

Procedure

Healthy control families were recruited via (social) media, advertisements, and flyers. Families with an adolescent with depression were recruited via advertisements, and in collaboration with mental health care facilities in the area of Leiden, the Netherlands.

Families interested in participation were informed and screened (i.e., brief check of in-and exclusion criteria) by phone. For families with an adolescent with depression an appointment was made to diagnostically interview the adolescent using the K-SADS-PL (Reichart et al., 2000), to check further in-and exclusion criteria. Subsequently (after screening for HC families, and after the K-SADS-PL interview for families with an adolescent with depression) participation consisted of four study parts: online questionnaires, one research day at the laboratory (during which the K-SADS-PL was assessed for HC adolescents), 14 consecutive days of EMA, and an fMRI scan session. All travel expenses were compensated. Adolescents received 15–55 euros and parents 73–103 euros of monetary compensation, depending on the study parts they participated in. Vouchers of 75 euros were raffled based on EMA compliance of the families. Lastly, adolescents with depression received written feedback based on their own report of several questionnaires (administered prior and during the research day). In the current study, we used part of the data of the lab assessment and the EMA.

The RE-PAIR study was approved in May 2018 by the Medical Ethical Committee of the Leiden University Medical Centre (LUMC; NL62502.058.17) and conducted in accordance with the declaration of Helsinki and the Dutch Medical Research Involving Human Subjects Act (WMO). Participants signed informed consent, and both parents with legal custody signed additional informed consent in case their child was younger than 16 years.

Parent–Child Interaction Tasks in the Lab

Parent-adolescent dyads completed three videotaped interaction tasks. The adolescent participated with both parents separately, in counterbalanced order. The researcher introduced the tasks one at a time, turned an hourglass to indicate the start of each task and the lapse of time, left the observation room, and came back after the indicated time had passed. Directly after each interaction task, the dyad filled out several questions about parenting behavior during the task and their own affect. The interaction tasks were:

- Problem solving interaction task (10 min; Davis et al., 2000). At the start of the lab assessment, the adolescent (once about mother, once about father) and parent(s) independently completed an adapted version of the Issues Checklist (Robin & Weis, 1980). This checklist contains an overview of topics that are commonly of issue to parent-adolescent dyads and has an open space to add topics. The participants indicated on a 5-point scale the frequency (1 = never, 5 = very often) and the intensity (1 = calm, 5 = very intense) of arguing over each topic in the past 4 weeks. The researcher selected the three topics that were reported to occur most frequently and intensely by the dyad, and wrote them on three numbered pieces of paper. If the adolescent and parent were inconsistent in their report of the topics, the parent's report was leading. The dyad was asked to discuss the topic(s) by elaborating on their point of view, and trying to find a solution to the issue. When they finished discussing the first topic and there was time left, they could proceed with the second and third topic.
- Event planning interaction task (6 min; adapted version of task by Schwartz et al., 2012). The dyad was asked to plan a (weekend) trip they would both enjoy, with unlimited budget. They were suggested to discuss their transport, activities, lunch/dinner plans, et cetera. When they finished and there was time left, they could proceed planning a second trip.
- Reminiscence interaction task (6 min; adapted version of task by Sheeber et al., 2012). At the start of the lab visit, the adolescent wrote down two emotional events they had experienced that made them feel sad, bad, or disappointed, and indicated how intense these events were on a 3-point scale (somewhat, moderately, very). This concerned events the parent was not involved in and, preferably, had not yet heard of. The adolescent was informed beforehand that they would be discussing the event(s) with their parent(s) during the interaction task. The adolescent was instructed to share the emotional event(s) with their parent and to start with the most intense one.

Measures

Observed Parental Autonomy Support and Psychological Control in Lab Setting

A new coding system, Coding Parental Autonomy Support and Psychological Control in Adolescence (CASPCA), was developed (coding manual included in Supplementary Methods) and used to (macro)code parental AS and PC behaviors per parent-adolescent interaction task. The CASPCA was developed based on behaviors as described in three existing coding systems (Barber, 1996; Hauser Kunz & Grych, 2013; Wuyts et al., 2018) and a questionnaire (Mageau et al., 2016) (Table S1), and on initial observations of videos of the current dataset. Previous coding systems included very relevant behaviors, but we felt the need to develop

Table 1

Sample Characteristics

	HC families	DEP families	Group Difference
Adolescents	(*N* = 80)	(*N* = 35)	
Biological sex, *n* (%) female	51 (63.7)	27 (77.1)	$\chi^2(1) = 2.00$, $p = .157$
Age (years), *M* (*SD*)	15.90 (1.35)	15.60 (1.55)	$t(57.65) = 1.00$, $p = .320$
Highest level of education, *n* (%)			$\chi^2(5) = 4.01$, $p = .548$
Lower vocational (Dutch: VMBO)	10 (12.5)	6 (17.1)	
Higher vocational (Dutch: HAVO)	20 (25.0)	6 (17.1)	
Pre-university (Dutch: VWO)	33 (41.3)	13 (37.1)	
Secondary vocational (Dutch: MBO)	5 (6.3)	5 (14.3)	
Higher professional (Dutch: HBO)	2 (2.5)	2 (5.7)	
Other	10 (12.5)	3 (8.6)	
Ethnicity, *n* (%) White	73 (91.3)	23 (65.7)	$\chi^2(1) = 11.51$, $p = .001$
PHQ-9, *M* (*SD*)	4.88 (2.94)	19.97 (4.71)	$t(45.99) = -17.54$, $p < .001$
PBI, *M* (*SD*)			
Maternal care	31.91 (4.18)	27.06 (6.58)	$t(46.58) = 4.02$, $p < .001$
Maternal overprotection	3.59 (2.43)	6.11 (3.73)	$t(47.26) = -3.66$, $p = .001$
Maternal autonomy granting	14.33 (2.89)	13.23 (4.33)	$t(47.96) = 1.38$, $p = .18$
Paternal care	29.75 (5.19)	25.81 (6.34)	$t(93) = 3.13$, $p = .002$
Paternal overprotection	3.18 (2.35)	4.59 (2.66)	$t(93) = -2.55$, $p = .012$
Paternal autonomy granting	14.43 (2.47)	13.63 (3.69)	$t(93) = 1.22$, $p = .224$
Parents	(*N* = 148)	(*N* = 62)	
Biological sex, *n* (%) female	79 (53.4)	35 (56.5)	$\chi^2(1) = 0.17$, $p = .683$
Age (years), *M* (*SD*)	49.00 (5.92)	50.13 (5.59)	$t(208) = -1.28$, $p = .203$
Highest level of education, *n* (%)			$\chi^2(2) = 4.97$, $p = .083$
High school	16 (10.8)	14 (22.6)	
Secondary vocational (Dutch: MBO)	34 (23.0)	13 (21.0)	
Higher vocational education or university (Dutch: HBO, WO)	98 (66.2)	35 (56.5)	
Ethnicity, *n* (%) White	144 (97.3)	49 (79.0)	$\chi^2(1) = 19.59$, $p < .001$
PHQ-9, *M* (*SD*)	3.00 (3.56)	4.92 (5.07)	$t(87.32) = -2.71$, $p = .008$
MINI, *n* (%)			
Current psychopathology	23 (15.5)	22 (35.5)	$\chi^2(1) = 10.32$, $p = .001$
Past psychopathology	45 (30.4)	32 (51.6)	$\chi^2(1) = 8.46$, $p = .004$
PBI[a], *M* (*SD*)			
Maternal care	32.91 (3.22)	29.91 (4.56)	$t(49.62) = 3.52$, $p = .001$
Maternal overprotection	3.86 (2.62)	5.66 (3.09)	$t(112) = -3.20$, $p = .002$
Maternal autonomy granting	14.03 (2.45)	12.60 (2.74)	$t(112) = 2.76$, $p = .007$
Paternal care[b]	29.67 (4.02)	28.78 (3.65)	$t(94) = 1.00$, $p = .320$
Paternal overprotection[b]	4.04 (2.39)	5.11 (2.69)	$t(94) = -1.90$, $p = .060$
Paternal autonomy granting[b]	14.07 (2.61)	13.30 (2.33)	$t(94) = 1.35$, $p = .181$

Note. Statistics presented here do not account for family clusters. HC = families with healthy control adolescent; DEP = families with adolescent with current MDD/dysthymia; PHQ-9 = Patient Health Questionnaire-9; PBI = Parental Bonding Inventory; MINI = Mini International Neuropsychiatric Interview. See Supplementary Methods for psychometric properties. Group differences were tested with independent t-tests (results were reported depending on Levene's test for equality of variances) and Pearson χ^2-test.

[a] PBI concerns self-reported parental bonding with participating child in the current study.

[b] Missing data PBI of one father HC group (thus n = 68 for father-report of PBI).

a new coding system for three main reasons. First, we aimed to use a coding system that includes AS and PC, but treats these as separate constructs. Barber (1996) described PC behaviors and Wuyts et al. (2018) AS behaviors (vs. controlling), thereby focusing on one construct. Second, we aimed to examine autonomy support rather than autonomy granting. Thereby including parents' attempts to empathize with and more deeply understand their child following their child's expressions, in addition to parents' attempts to stimulate their child to initiate expressions. Hauser Kunz & Grych (2013) developed a coding system including autonomy granting and PC as separate constructs. And lastly, we aimed to use a concise number of subscales, covering the relevant behaviors of AS and PC. Previous coding systems included very relevant behaviors, but we wanted to further group these together. Table S1 presents the behaviors of existing coding systems and the questionnaire that were used to develop the CASPCA subscales. We decided not to include 'love withdrawal' in the coding of PC, because we expected this behavior would not occur during instructed parent-adolescent interactions in the lab setting. Lastly, we used the format of the negativity scale of the coding system by Allen et al. (2001), as a format to code intensities of PC behaviors.

Parental AS was coded on three 9-point subscales: (1) encouragement of the adolescent's input (i.e., (non)verbal encouragement, demonstrating patience); (2) explanation of the parent's own motivations (i.e., clear/calm/respectful manner, adjusted to adolescent's mood and understanding); (3) receptiveness to the adolescent's input (i.e., active acceptance, relating and understanding). A higher score indicates higher levels of the behavior (see coding manual in Supplementary Methods). The subscale 'Explaining motivations' was only coded for the problem solving task; giving motivations in itself was not considered to be autonomy supportive in the event planning (can deduce positivity of interaction) and reminiscence (indicates focus on own perspective rather than adolescent's perspective) task. To ensure that the (absence of) relations of observed AS with other variables was not due to including 'Explaining motivations' only for the problem solving task, we also computed a mean score for this task based on 'Encouraging input' and 'Receptiveness to input' only.

Parental PC was also coded on three 9-point subscales: (1) constraining the adolescent's expressions (i.e., dominating behavior, dominating content, disinterest); (2) guilt induction (i.e., making adolescent unreasonably responsible, prioritizing own perspective); (3) invalidating the adolescent's emotions (i.e., assigning values, minimalizing). A higher score indicates higher levels of the behavior (see coding manual in Supplementary Methods). The mean of subscales was used to respectively indicate the overall level of AS and PC. Thus, six scores were assigned to each parent (three interaction tasks * two constructs).

Two groups of undergraduate students in psychology and family studies (group 1: $n = 6$, group 2: $n = 7$) were trained in five sessions and reliably coded a reliability set of 30 videos (average measures ICC AS $r = .96$, PC $r = .94$). The first session of the training consisted of an introduction to the constructs, coding system and some example fragments of the behaviors. Next, the students independently coded three to six videos in preparation per session (all videos of exclusion families), which were discussed during the subsequent sessions. Coders were blind to group status of the participants and other outcome variables (e.g., perceived parenting behaviors). The first group of students coded all videos that were available at that point ($n = 148$ HC parents, $n = 30$ parents of adolescents with depression). The second group ($n = 7$) double-coded the videos (three tasks) of 20 parents of the HC families (average measures ICC AS $r = .73$, PC $r = .59$) to ensure they also coded a mix of the subsamples and coded the videos of the remaining 32 parents of adolescents with depression. For the double-coded videos, the second round of coding was used as the final scores.

Adolescent-Perceived Parental Listening/Understanding and Criticism/Dominance

Adolescent-perceived parental L/U and C/D were assessed directly after each interaction task. Adolescents reported on four items (i.e., “How well did your [mother/father] [listen to/understand] you?” and “How [critical/dominant] was your [mother/father] towards you?”) on a 7-point scale (1 = not at all, 7 = very). The means of the items on listening and understanding, and of the items on criticism and dominance were used to respectively indicate the level of adolescent-perceived L/U and C/D. A higher score represents higher levels of the specific behavior. Thus, six scores were assigned to each parent–child dyad (three interaction tasks * two constructs).

Adolescent Positive and Negative Affect

Adolescent positive and negative affect were assessed prior to the start of the first interaction task (baseline) and directly after each interaction task using an adapted and shortened version of the Positive and Negative Affect Schedule for Children (PANAS-C; Ebesutani et al., 2012; Watson et al., 1988). The adolescent reported on four items (i.e., “How [happy/sad/relaxed/irritated] are you feeling at the moment?”) on a 7-point scale (1 = not at all, 7 = very). The mean of the items

on happy and relaxed, and of the items on sad and irritated respectively indicated the level of adolescent positive and negative affect. Higher scores represented higher levels of positive and negative affect. In the main analyses, pre-task affect per task concerned affect prior to the start of the specific interaction task. Thus, baseline affect is the pre-task affect for the problem solving task; post-problem solving affect is the pre-task affect for the event planning task; and post-event planning affect is the pre-task affect for the reminiscence task. A total of 12 scores were assigned to each parent–child dyad for mean levels of adolescent positive and negative affect in the lab (three pre-task* two constructs + three post-task* two constructs).

Adolescent-Perceived Parental Listening/Understanding and Criticism/Dominance in Daily Life

For a detailed description of the EMA procedure, see (Janssen et al., 2021). We preregistered to use proximity-triggered questionnaires, but because we had less data available for these measures, we decided to use the fixed daily questionnaires. Families filled in the EMA after the lab assessment. Adolescents received four fixed questionnaires per day, for 14 consecutive days, in which they were asked whether they had interacted with their parent(s) since the last questionnaire. If the adolescent had interacted face-to-face with one or both parents who had also participated in the lab assessment of RE-PAIR, they reported on four items (i.e., "How well did your [mother/father] [listen to/understand] you?" and "How [critical/dominant] was your [mother/father] towards you?") on a 7-point scale (1 = not at all, 7 = very) per parent. We excluded all interactions via phone and online interactions. Two scores were assigned to each parent–child dyad: the mean of listening and understanding of all questionnaires across all days indicated the level of adolescent-perceived L/U in daily life and the mean of criticism and dominance indicated the level of adolescent-perceived C/D. A higher score represents higher levels of the specific behavior throughout the EMA period. HC adolescents completed 11.24 questionnaires on average (*SD* = 7.14, range [0, 33]).

Statistical analyses

Contrary to our preregistration, we used the lme4 package (Bates et al., 2015) for multilevel modeling in R software (version 4.3.0; R Core Team, 2023) and the permute package (Simpson et al., 2022) for permutation testing to correct for multiple testing. Multilevel modeling was used because of the nested structure of our data: Standardized (*z*-scores) observations (level 1) are clustered within persons (level 2), which are clustered within families (level 3). Parameters are added step-by-step, and model fit improvement is tested with the Likelihood ratio test. Parameters of main interest per model are kept in the model regardless of the significance of model fit improvement. In all models, biological sex (male, female) of parent and child, and child age are included as covariates in the final step.

Table 2

Descriptive Statistics Main Variables

	HC families				DEP families			
	$n_{parents}$	$n_{adolescents}$	*M* (SD)	α	$n_{parents}$	$n_{adolescents}$	*M* (SD)	α
Observed parental autonomy support								
Problem solving	148	80	5.77 (1.56)	.83	62	35	5.60 (1.70)	.87
Event planning	148	80	6.17 (1.47)	.78	62	35	5.84 (1.67)	.75
Reminiscence	146	79	6.60 (1.47)	.76	62	35	6.26 (1.79)	.89
Observed parental psychological control								
Problem solving	148	80	2.98 (1.35)	.67	62	35	2.95 (1.44)	.68
Event planning	148	80	2.35 (0.97)	.43	62	35	2.53 (1.13)	.51
Reminiscence	146	79	2.40 (1.06)	.42	62	35	2.56 (1.42)	.65
Adolescent-perceived parental listening/understanding								
Problem solving	148	80	5.83 (1.12)	.86	61	34	5.34 (1.55)	.94
Event planning	146	80	6.37 (0.80)	.71	62	35	6.01 (1.16)	.92
Reminiscence	143	79	6.36 (0.78)	.76	62	35	5.83 (1.16)	.88
Adolescent-perceived parental criticism/dominance								
Problem solving	148	80	2.81 (1.20)	.56	61	34	2.93 (1.40)	.64
Event planning	146	80	1.83 (0.96)	.37	62	35	2.06 (1.27)	.81
Reminiscence	143	79	1.81 (1.01)	.61	62	35	2.29 (1.37)	.81
Adolescent positive affect								
Baseline	147	80	5.10 (1.04)	.68	62	35	3.60 (1.17)	.74
Problem solving	148	80	5.32 (0.88)	.62	62	35	3.66 (1.30)	.75
Event planning	146	80	5.82 (0.83)	.58	62	35	4.43 (1.30)	.78
Reminiscence	143	79	5.15 (1.12)	.74	62	35	3.72 (1.26)	.83
Adolescent negative affect								
Baseline	147	80	1.43 (0.77)	.53	62	35	2.69 (1.20)	.64
Problem solving	148	80	1.38 (0.64)	.46	62	35	2.91 (1.41)	.64

Event planning	146	80	1.15 (0.36)	.46	62	35	2.34 (1.29)	.60
Reminiscence	143	79	1.55 (0.80)	.37	62	35	2.89 (1.38)	.65
Adolescent-perceived parenting daily life (ecological momentary assessment)								
Parental list./und.	142	79	5.63 (0.96)	.90	58	34	5.39 (0.97)	.90
Parental cr./dom.	142	79	1.88 (0.95)	.77	58	34	2.09 (1.00)	.84

Note. Statistics presented here do not account for family clusters. HC = families with healthy control adolescents; DEP = families with adolescents with current MDD/dysthymia. α indicates the Cronbach's alpha for internal reliability of the subscales per measure.

We performed permutation tests to correct for multiple testing per combination of outcomes (because observed and perceived parenting as well as affect were split in a positive and negative component, doubling all models) in case of significant results. The data are permuted with a thousand shuffles and the observed coefficients of the models (*t* value) are compared to the permuted coefficients of the models, in order to estimate the robustness of the observed effect (Dudoit et al., 2003). This comparison was always based on the simplest model, including only the fixed effects of the independent variable and the type of task.

Results

Descriptive Analyses

Data of 192 out of the 210 parent-adolescent dyads (91.4%) were complete on all main variables (Supplementary Methods). Healthy control families and families with an adolescent with depression did not differ on most of the demographic variables: adolescents' age, biological sex, and level of education, and parents' age, biological sex, and level of education (all *p*'s > .05; Table 1). HC adolescents and parents reported a white ethnicity more often than adolescents with depression and their parents (*p*'s < .05; Table 1). Across tasks and groups, we found moderate negative correlations between AS and PC ($r = -.63$, $p < .001$), adolescent-perceived L/U and C/D ($r = -.50$, $p < .001$), adolescent positive and negative affect (across tasks: $r = -.51$, $p < .001$), and adolescent-perceived L/U and C/D in daily life ($r = -.62$, $p < .001$). Correlations per task per group are presented in Table S2. Descriptive statistics of observed and adolescent-perceived parenting behaviors and of adolescent affect are presented in Table 2.

Multilevel Analyses

Separate models were run for observed AS and PC because of moderate correlations between these variables, rather than including them as multiple predictors in one model. All model fit statistics and final models (in bold) are presented in Table S3 (aim one) and Table S8 (aim two). Intraclass correlations indicating the proportion variance accounted for by the person and family level are presented per final model in Tables S4–S7 (aim one) and Tables S9–S11 (aim two). Distributions of observed and adolescent-perceived parenting behaviors are presented in Figure 1.

Aim One: Coding AS and PC in HC sample

Task Differences in Observed Parenting Behaviors (H1.1). We first tested whether parents showed less AS and more PC in the problem solving than event planning and reminiscence task (H1.1). In line with our hypotheses, we found significantly lower levels of observed AS in the problem solving than event planning ($B = 0.262$, $SE = .099$, $p = .009$) and reminiscence task ($B = 0.541$, $SE = .099$, $p < .001$). Observed AS was significantly higher in the reminiscence than event

planning task (B = 0.279, SE = .099, p = .005). We furthermore found significantly higher levels of observed PC in the problem solving than event planning (B = −0.543, SE = .103, p < .001) and reminiscence task (B = −0.504, SE = .103, p < .001), but no significant difference in observed PC between the reminiscence and event planning task (B = 0.039, SE = .103, p = .085). Results are presented in Table S4.

The permutation test (based on model including fixed effects of type of task) showed that the differences in observed AS in the problem solving than event planning task, and in observed AS in the reminiscence than event planning task were almost fully robust: Respectively 4.0% and 1.5% of permuted coefficients were larger than the observed coefficient. The other significant effects were fully robust to the correction.

Task Differences in Adolescent-Perceived Parenting Behaviors (H1.2). We tested whether adolescents perceived their parents as less L/U and more C/D during the problem solving than event planning and reminiscence task (H1.2). The model had trouble converging when including all covariates due to its complexity, maximizing iterations did not solve the problem. We only included the significant covariate (parental biological sex) to ensure a stable model. In line with the hypothesis, adolescent-perceived L/U was significantly lower in the problem solving than event planning (B = 0.566, SE = .075, p < .001) and reminiscence task (B = 0.578, SE = .072, p < .001). There was no significant difference in adolescent-perceived L/U between the reminiscence and event planning task (B = 0.012, SE = .076, p = .873). In line with the hypothesis, adolescent-perceived C/D was higher in the problem solving than event planning (B = −0.836, SE = .074, p < .001) and reminiscence task (B = −0.885, SE = .075, p < .001). There was no significant difference in adolescent-perceived C/D between the reminiscence and event planning task (B = −0.049, SE = .075, p = .513). Results are presented in Table S4. The permutation test (based on model including fixed effects of type of task) showed that the significant differences were fully robust.

Observed Parenting Behaviors' Relation with Adolescent-Perceived Parenting Behaviors and Adolescent Affect (H1.3).

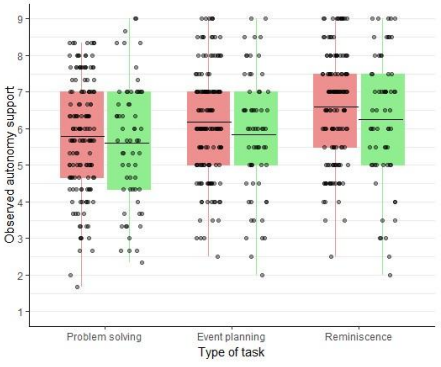
Adolescent-Perceived Parenting Behaviors. We tested whether observed AS and PC related to adolescent-perceived L/U and C/D (H1.3). Observed AS was not significantly related to adolescent-perceived L/U (B = 0.072, SE = .039, p = .067) when controlling for type of task and the covariates. Higher levels of observed AS significantly related to lower levels of adolescent-perceived C/D (B = −0.120, SE = .038, p = .002), while controlling for type of task and the covariates. Higher levels of observed PC related to lower levels of adolescent-perceived L/U (B = −0.093, SE = .038, p = .014) and higher levels of adolescent-perceived C/D (B = 0.107, SE = .037, p = .004), while controlling for type of task and the covariates. Results are presented in Table S5.

The permutation test (based on model including fixed effects observed behavior and type of task) showed that the relation between observed AS and adolescent-perceived C/D, and between observed PC and adolescent-perceived L/U and C/D were robust: Respectively 0.6%, 6.6%, and 2.3% of the permuted coefficients were larger than the observed coefficients.

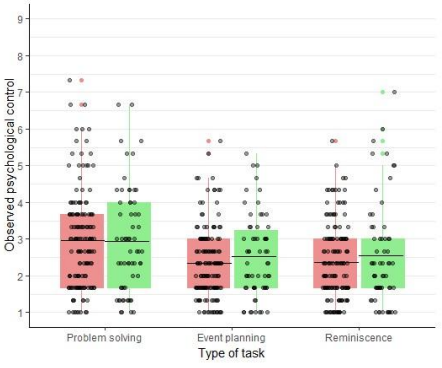
Figure 1

Distribution of Observed and Adolescent-Perceived Parenting Behaviors per Group per Task

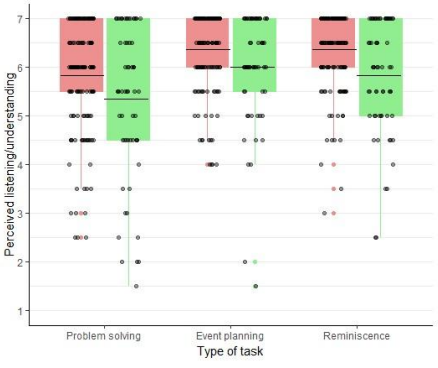
a. Observed AS



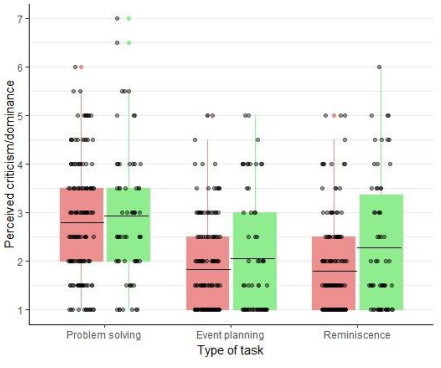
b. Observed PC



c. Adolescent-Perceived L/U



d. Adolescent-perceived C/D



Note. Distributions presented here do not account for family clusters. Families with a healthy control adolescent; Families with an adolescent with current MDD/dysthymia. Sample sizes per type of task and type of parenting behavior are reported in Table 2. Bar in the boxplot indicates mean level.

Adolescent Affect. We tested whether observed AS and PC related to adolescents positive and negative affect (H1.3). Pre-task positive and negative affect was respectively added per set of multilevel modeling. Observed AS was not significantly related to adolescent positive (B = 0.054, SE = .060, p = .368) and negative (B = −0.020, SE = .041, p = .629) affect. However, there was a significant interaction effect between observed AS and type of task on adolescent positive affect. Specifically, during the reminiscence task, higher levels of observed parental AS related to *lower* levels of adolescent positive affect, while controlling for pre-task affect (reminiscence vs. problem solving; B = −0.224, SE = .082, p = .006; reminiscence vs. event planning; B = −0.216, SE = .084, p = .011). Observed PC was not significantly related to adolescent positive (B = 0.036, SE = .046, p = .440) and negative (B = −0.008, SE = .040, p = .834) affect. Results are presented in Table S6.

Observed Parenting Behaviors' Relation With Adolescent-Perceived Parenting Behaviors in Daily Life (H1.4). We tested whether observed AS and PC (mean levels across the three interaction tasks) related to adolescent-perceived L/U and C/D in daily life (H1.4). The person level did not vary and a cluster at that level (and relating ICC analysis) was not applicable. Observed AS did not relate to adolescent-perceived L/U (B = 0.114, SE = .076, p = .136) and C/D (B = −0.051, SE = .078, p = .517) in daily life. Observed PC did significantly relate to adolescent-perceived L/U in daily life (B = −0.176, SE = .068, p = .011), with higher levels of observed PC in the lab relating to lower levels of adolescent-perceived L/U in daily life. Observed PC did not relate to adolescent-perceived C/D in daily life (B = 0.081, SE = .073, p = .266). Results are presented in Table S7.

The permutation test (based on model including fixed effects observed behavior) showed that the relation between observed PC and adolescent-perceived L/U in daily life was robust: Only 6.6% of the permuted coefficients were larger than the observed coefficient. We checked whether the results changed when excluding ‘Explaining motivations’ as a subscale in the mean score of AS in the problem solving task (see Measures). This was not the case, the (in)significance of none of the effects changed.

Aim Two: Comparing Families with an Adolescent with Depression to HC Families

Observed Parenting Behaviors (H2.1). We tested whether parents of adolescents with depression (vs. HC) showed less AS and more PC (H2.1). There was no significant group effect for observed AS (B = −0.184, SE = .117, p = .120), nor for observed PC (B = 0.083, SE = .100, p = .410) (Table S9), the hypothesis was therefore not confirmed. Additionally, we explored whether there were group differences in the three subscales of AS and the three of PC, which was not the case (all p's > .10).

Adolescent-Perceived Parenting Behaviors (H2.2). We tested whether adolescents with depression (vs. HC) perceived their parents as less L/U and more C/D (H2.2). In testing the group effect on adolescent-perceived L/U, the model had trouble converging when including the random slopes. Maximizing iterations did not solve the problem and the parameter was dropped to ensure a stable model. In line with the hypothesis, adolescents with depression perceived their parents as significantly less L/U than the HC adolescents (B = −0.431, SE = .145, p = .004). In testing the group effect on adolescent-perceived C/D, the interaction term (group*type of task; model 5) did not significantly improve model fit, but showed a trend (p = .067). To understand the (possible) effect at play, the parameter was therefore included. There was no significant main effect of group on adolescent-perceived C/D (B = 0.136, SE = .163, p = .406), but there was a significant interaction effect of group by type of task (reminiscence vs. problem solving: B = 0.293, SE = .133, p = .028), indicating that adolescents with depression (vs. HC) reported higher levels of C/D specifically in the reminiscence task. Results are presented in Table S9.

The permutation test (based on model including fixed effect of group and type of task) showed that the group difference in adolescent-perceived L/U was not robust: 53.5% of permuted coefficients were larger than the observed coefficient.

Adolescent Views on Parenting Behaviors (H2.3). We tested whether the relation of observed AS and PC with adolescent-perceived L/U and C/D was different for adolescents with depression (vs. HC) (H2.3). There was no effect of group on the relation of observed AS with adolescent-perceived L/U (B = 0.062, SE = .063, p = .322) and C/D (B = 0.079, SE = .065, p = .223), neither on the relation of observed PC with adolescent-perceived L/U (B = −0.067, SE = .060, p = .264) and C/D (B = 0.011, SE = .062, p = .865). In both groups, observed AS negatively related to adolescent-perceived C/D, and observed PC negatively related to adolescent-perceived L/U and positively related to adolescent-perceived C/D. Results are presented in Table S10.

Adolescent Affective Responses to Parental Observable Behaviors (H2.3). We tested whether the relation of observed AS and PC with adolescent positive and negative affect was different for adolescents with depression (vs. HC) (H2.3). Pre-task positive and negative affect was respectively added per set of multilevel modeling. There was no effect of group on the relation between observed AS and adolescent positive (B = 0.029, SE = .054, p = .589) and negative (B = −0.037, SE = .052, p = .486) affect, nor for the relation between observed PC and adolescent positive affect (B = −0.067, SE = .050, p = .177). In both groups, observed AS did not relate to adolescent positive and negative affect, and observed PC did not relate to adolescent positive affect. However, group status did interact with the relation between observed PC and negative affect (B = 0.122, SE = .050, p = .015). Observed PC related to more adolescent negative affect in adolescents with depression, but not in HC adolescents. Results are presented in Table S11.

The permutation test (based on model including fixed interaction effect, pre-task affect, and type of task) showed that the interaction effect of group status on the relation between observed PC and adolescent negative affect was almost fully robust: Only 0.7% of the permuted coefficients were larger than the observed coefficient. We checked whether the results changed when excluding 'Explaining motivations' as a subscale in the mean score of AS in the problem solving task (see Measures). This was not the case, the (in)significance of none of the effects changed.

Covariates

We found significant effects for the covariates biological sex of the parent and pre-task affect in aim one (Tables S4–S6) and two (Tables S9–S11). Adolescents perceived their fathers as more L/U and less C/D than their mothers, and positive and negative pre-task affect respectively positively related to positive and negative post-task affect. Further, in studying both aims, type of task as a variable of interest had a significant effect on adolescent affect. Positive affect was lower and negative affect higher in the problem solving than event planning and reminiscence, and in the reminiscence than event planning task. Specifically in aim one, HC boys perceived their parents as significantly less C/D than girls. Lastly, we additionally included ethnicity as a covariate in aim two (group comparisons), given the significant group difference on this variable (see Descriptive Analyses). The (in)significance of the effects reported in aim two did not change.

Discussion

The current study aimed to (1) develop a reliable coding system for parental autonomy support and psychological control in different contexts of parent-adolescent interactions, gain insights into its ecological validity, and (2) disentangle observed and adolescent-perceived parenting behaviors in relation to adolescent depression. First, we developed a new and reliable coding system for observed parental autonomy support and psychological control, that showed ecological validity. With regards to adolescent depression, adolescents with depression (vs. HC) perceived their parents as somewhat less listening/understanding across interactions (effect is not robust) and perceived them as more critical in emotional interactions, but their parents did not show less observable autonomy support nor more psychological control. And lastly, following observed parental psychological control the negative affective state of adolescents with depression (but not HC) worsened.

Aim One: Coding Observed Parental Autonomy Support and Psychological Control

Results of the current study importantly add to the understanding of parental autonomy support and psychological control during adolescence. We reached our

first aim by developing a new and reliable coding system, CASPCA, with separate assessments for observed parental autonomy support and psychological control, that is sensitive to the context of parent-adolescent interactions. Aligning previous work (Barber et al., 2005; Hauser Kunz & Grych, 2013), the current study shows that it is important to not put autonomy support and psychological control on one continuum, because of moderate negative correlations (see Table S2) between these behaviors and the different patterns of results (e.g., psychological control, but not autonomy support, related to adolescent-perceived listening/understanding in the lab and in daily life).

As expected, autonomy support was lower and psychological control higher in the more challenging (i.e., demanding, stressful) problem solving task than the event planning and reminiscence tasks, thereby aligning previous studies (Branger et al., 2019; Grolnick et al., 2002; McCurdy et al., 2020). The same effects (more negative in problem solving task) were found for adolescent-perceived parental listening/understanding and criticism/dominance. Interestingly, parents showed even more autonomy support in the reminiscence than event planning task, and are thus better able to display this behavior in an emotional context. Adolescents did not perceive their parents as more listening/understanding in the reminiscence task, which may be explained by a ceiling effect of this behavior (M = 6.5 out of a 7-pointscale in event planning task) or an increased focus of adolescents on the self, given the nature of the task (ding a personal emotional event). In conclusion, it is important to consider the context of the interaction in research (and clinical practice), because different contexts elicit different levels of observed autonomy support and psychological control, and of adolescent-perceived listening/understanding and criticism/dominance.

The CASPCA coding system is ecologically valid in measuring parenting behaviors that are relevant to adolescents' experiences of feeling listened to/understood and feeling criticized/dominated by their parents. Observed autonomy support negatively related to adolescent-perceived criticism/dominance, and observed psychological control negatively related to adolescent-perceived listening/understanding and positively to criticism/dominance. Observed psychological control also related to adolescents' daily life experiences of feeling listened to and understood. Previous studies showed that more negative observed parenting relates to more negative *global* levels of adolescent-perceived parenting (Wuyts et al., 2018), and that observed parenting behavior in the lab related to adolescents' perceptions of their parents' momentary behavior in daily life (i.e., expressed affect of parent towards child) (Griffith et al., 2018). Together these and current findings suggest that observing parenting behaviors in a lab setting holds ecological validity to adolescents' experiences of momentary parenting behaviors (in daily life).

The results further indicate that, although autonomy support and psychological control should be treated as separate constructs, they are clearly related to each

other and show cross-over effects. A parent who shows higher levels of psychological control (e.g., forcing solutions, invalidating the adolescent) makes their child feel more criticized and dominated, but also less listened to and understood. Whereas a parent who shows low levels of autonomy support (e.g., little to no questions, patience, or genuine interest) does not directly make their child feel less listened to and understood, but it does make the child feel more criticized and dominated. Psychological control may have a more profound, or direct, effect on adolescents' experiences than autonomy support. Observed autonomy support and psychological control generally did not relate to HC adolescent affective state. However, in the reminiscence task, observed AS related to *lower* positive affect, while controlling for pre-task affect. Parental expressions of AS in this emotional task notably related to adolescents feeling less well instead of better. Further research could examine the mechanism underlying this relation.

Aim Two: Parental Autonomy Support and Psychological Control in the Context of Adolescent Depression

Using the newly developed coding system, we have also acquired important insights into observed and perceived parenting in the context of adolescent depression. Previous work showed that global levels of perceived parental autonomy support and psychological control relate to adolescent depressive symptoms, in mainly normative populations (Barber et al., 2005; Chyung et al., 2022; Gorostiaga et al., 2019; Van der Giessen et al., 2014). The current study did not find different levels of observed autonomy support and psychological control in a clinical (vs. HC) sample, whereas adolescents with depression did perceive their parents as less listening/understanding across the interaction tasks and as more critical/dominant in the emotional reminiscence task. Combining current and previous results, research shows that perspectives on parenting matter, and that adolescent depression appears to relate to perceived, but not observed, parenting. Previous findings on overall perceived autonomy support and psychological control can thus be translated to perceived listening/understanding and criticism/dominance in specific interactions between parents and adolescents with a clinical depression. These behaviors cover important parts of respectively autonomy support and psychological control, but are not equivalent to each other. Possibly, different nuances in these constructs may explain the divergent results. Another important possible explanation for the divergent results may be that adolescents with depression (vs. HC) have more negative perceptions. This aligns meta-analytic evidence showing stronger effects for child-reports than observations of parenting on childhood depression (McLeod et al., 2007; Pinquart, 2017). It should be noted that the group difference in perceived listening/understanding was clearly significant (p = .004), but not robust to the correction (53.5% of the imputed coefficients were larger than the observed coefficient). This may indicate heterogeneity in the sample, with more negative perceptions in some adolescents with depression, but not others; further research is needed.

Several factors may explain the more negative perceptions (relative to observations) of adolescents with depression. First, previous experiences of parenting (e.g., more negative in daily life than in lab setting) or the overall parent–child bond may have shaped the negative perception bias of adolescents with depression in these specific interactions. The adolescents' representation of their parents' behavior may be more negative, thereby affecting their reports of parenting in specific interactions. Second, the adolescent's overall affective state may have led to a negativity bias. Van der Kaap-Deeder et al. (2023) found that adolescents' affect preceded their perceptions of parenting in daily life. Similarly in our study, adolescents' baseline affective state (reported in Table 2) may have influenced perceived parenting behaviors. A last possible factor is that expressions of parents' negative behavior in the interactions, are perceived more negatively by adolescents with depression (vs. HC). However, current results do not confirm this: The relation of observed autonomy support and psychological control with adolescent-perceived listening/understanding and criticism/dominance did not differ between groups.

Lastly, the current study highlights the negativity of observed parental psychological control in the context of adolescent depression, even though parents of adolescents with depression did not express more of this behavior when interacting with their child (i.e., no group differences in observed psychological control). Adolescents with depression reported more negative affect following their parents' psychological control. Interestingly, this was not the case for HC adolescents. This is in line with previous self-report studies that indicate that psychological control dysregulates adolescents' feelings (Barber, 1996; Deci & Ryan, 2000), specifically in adolescents who already have difficulties in sadness regulation (Cui, 2013). The latter result is hereby extended to the relation of observed psychological control with adolescent affective state in interactions with their parents. Psychological control can be considered as a form of rejection towards the child's thoughts, feelings, and cognitions, and depression is known to relate to higher rejection sensitivity (e.g., Gao et al., 2017; Garber et al., 1997). The current study shows that the negative affective state of adolescents with depression worsened after their parents' expressed psychological control, suggesting that these adolescents are indeed sensitive to this rejecting type of parenting behavior. Remarkably, HC adolescents appear to be resilient to this parenting behavior in specific interactions with their parents. The feeling of ‘walking on eggshells’ (i.e., carefully considering own behavior to prevent the child from feeling worse) that parents of adolescents with depression reported in a qualitative study (Stapley et al., 2016) thereby seems to be confirmed by data in our study; negative parenting behavior in specific interactions indeed makes the adolescent (with depression) feel worse.

Clinical Implications

Results of the current study highlight the importance to consider multiple perspectives on parent-adolescent interactions in the clinical setting and can be translated into three main implications. First, our study shows that different contexts elicit different levels of specific parenting behaviors. A stressful, demanding context (i.e., problem solving) elicits more negative parenting behaviors than a more positive (i.e., event planning) and emotional (i.e., reminiscence) context; this holds for observed as well as adolescent-perceived parenting behaviors. Moreover, an emotional context elicits specifically more observable autonomy support. It is thus important to consider the context when evaluating parenting behaviors.

Second, adolescents with depression report more negative parenting behaviors than their HC peers, whereas there is no difference in observed parenting behaviors. Generally, the perception of the adolescent forms the reference point for therapy. It should be kept in mind that the adolescent's perception is not equal to the actual behavior of the parent. Along the lines of cognitive behavioral therapy, therapists could reflect with the adolescent on what biases might be set in motion for the adolescent in response to their parents' behavior. It may further be of value to reflect whether biases mainly originate from the depressive state and/or also from previous and daily life experiences of parenting behaviors and communication. Third, it is important to also consider observable parental psychological control when treating adolescents with depression. This parenting behavior worsens the affective state of adolescents with depression in interactions with their parent. Parents could be psycho-educated and/or intervened on this behavior and the impact it has on their child.

Strengths and Limitations

To the best of our knowledge, the current study is the first to disentangle observed and adolescent-perceived parenting behaviors concerning the same parent-adolescent interactions, and thereby importantly adds to existing literature. It is further one of the first to link observations to adolescent-perceived parenting behavior in daily life, indicating ecological validity of observing parenting behaviors in the lab. We were also able to include families with adolescents with a clinical depression, and a substantial number of fathers.

The current study has several limitations. First, the sample of adolescents with depression was relatively small, limiting the power of aim two of the study. Second, some important sample characteristics should be noted. Adolescents with certain comorbid disorders (i.e., intellectual disability, psychosis, eating disorders, substance use disorders, and/or autism spectrum disorders) were excluded and results cannot be simply generalized to all adolescents with a depression. Third, in both samples (clinical and HC), adolescents and parents had to be willing to participate together, which may have led to a selection bias. And fourth, the

intercoder reliability of observed psychological control for the double-coded videos was moderate. This might be due to coding with two groups (for practical reasons of coding a dataset of 628 videos with available students) with separate intervision meetings and/or due to low variability in observed PC, with subsequent larger impact of deviations in scoring.

Conclusion

To conclude, results of this multi-method study highlight three key messages. First, the newly developed CASPCA coding system was reliable and showed ecological validity, and can thus be well used to assess observed parental autonomy support and psychological control in parent-adolescent interactions across different contexts in research. Second, adolescents with depression (vs. HC) perceived their parents somewhat more negative, but their parents did not behave differently (from HC) when interacting with the adolescent, indicating a negativity bias of adolescents with depression. And third, although parents of adolescents with depression did not express more observable psychological control, their expressed psychological control was followed by their child feeling worse, which was not the case for HC adolescents. Parents could be psycho-educated (and intervened) on this behavior and its impact in a clinical setting.

Supplementary Materials

Participants

Data of 192 of the 210 parent-adolescent dyads (91.4%) were complete on all main variables. The reminiscence task was not assessed for one of the HC families (*n* = 2 parents) because the task was too stressful for the adolescent. Therefore, observed, perceived, and affect data were missing for this task. Data of adolescent-perceived parental listening/understanding and criticism/dominance was missing for five HC parents (n = 2 EPI, n = 3 REM) and one parent of an adolescent with depression (problem solving task), and data of adolescent positive and negative affect was missing for six HC adolescents (*n* = 1 baseline, *n* = 2 event planning task, *n* = 3 reminiscence task), because the researcher forgot to assess these measures in between the interaction tasks. Mean levels of adolescent-perceived listening/understanding and criticism/dominance in daily life were missing for six parents of HC adolescents, because there was an error in scaling of the items in the application (*n* = 2 from one family) or the adolescent had not filled out any of the questions on parental behavior (*n* = 4 fathers). We performed Little's MCAR test (Little, 1988) to check whether data were missing completely at random, which was the case ($\chi^2(132) = 88.59$, $p = .999$).

Measures

Depression Symptomatology

The Patient Health Questionnaire-9 (PHQ-9) was used to assess depression symptomatology of adolescents and parents. The PHQ-9 is a well-validated and frequently used questionnaire, for which cut-off scores have been determined representing mild, moderate, moderately severe, and severe depression (Kroenke et al., 2001). A higher continuous score represents higher depression symptomatology.

Adolescents self-reported ten items on their depressive symptomatology in the past two weeks (e.g., "How often have you been bothered by feeling down, depressed, or hopeless?") on a 4-point Likert scale (0 = not at all, 1 = some days, 2 = more than half of the days, 3 = almost every day). One item of the original PHQ-9 was split into two items to avoid ambiguity: "How often have you been bothered by moving and speaking slower than usual?" and "How often were you so fidgety or restless that you moved around more than usual?". The item with the highest score was selected in further data processing. The final nine items were summed into the total score of depression symptomatology. Internal reliability in the sample with adolescents with depression was acceptable (Cronbach's α = .76) and in the HC sample was questionable (Cronbach's α = .62).

Parents self-reported ten items on their depressive symptomatology in the past two weeks (e.g., "How often have you been bothered by little interest or pleasure in doing things?") on a 4-point Likert scale (0 = not at all, 1 = some days, 2 = more

than half of the days, 3 = almost every day). The original nine items of the PHQ were used, with one additional item if the parent had experienced one or more items at some or more days (i.e., impact on daily functioning; 0 = not at all, 1 = somewhat, 2 = very, 3 = extremely). This final item was not included in the further data processing. The original nine items were summed into the total score of depression symptomatology. Internal reliability in the sample with adolescents with depression was good to excellent (mothers' Cronbach's α = .90; fathers' Cronbach's α = .89) and in the HC sample was acceptable to good (mothers' Cronbach's α = .77; fathers' Cronbach's α = .90).

Parental Bonding

The Parental Bonding Inventory was used to assess the parent-adolescent bonding. The PBI is a well-validated and frequently used questionnaire (e.g. Tam & Yeoh, 2008). The original PBI consists of two subscales (care, control), but a three-factor solutions has been shown to have better psychometric properties (Kullberg et al., 2020). Participants self-reported on 25 items on a 4-pointscale (0 = (totally) true, 3 = (totally) untrue). Adolescents reported on their mothers' and fathers' bonding separately, mothers and fathers separately reported on their own bonding towards their child. Data was missing for one father of the HC families, resulting in a total of 68 fathers of HC adolescents reporting on their own bonding. One of the items (of the Autonomy granting subscale) was translated incorrectly ("wants me to grow up" instead of the original "does not want me to grow up") and excluded in current analyses. Items were recoded if necessary and summed into three subscales: Care (12 items; e.g. "My [mother/father] spoke to me in a warm and friendly voice"), Overprotection (6 items; e.g. "My [mother/father] felt I could not look after myself unless they were around"), and Autonomy granting (5 items; e.g. "My [mother/father] liked me to make my own decisions"). Note that the PBI subscale on autonomy concerns autonomy granting and not autonomy support, and thus differs from the construct of the coding system in the current study. A higher score represents higher levels of the respective bonding subscale (e.g., higher score on Care, represents *higher* levels of parental care).

Internal reliability (with Cronbach's α) of Care in the sample with adolescents with depression was questionable to good (adolescents about mother α = .88, adolescents about father α = .86, mothers Cronbach's α = .82, fathers Cronbach's α = .66) and in the HC sample was questionable to good (adolescents about mother α = .83, adolescents about father α = .86, mothers Cronbach's α = .74, fathers Cronbach's α = .69). Internal reliability of Overprotection in the sample with adolescents with depression was unacceptable to acceptable (adolescents about mother α = .71, adolescents about father α = .42, mothers Cronbach's α = .71, fathers Cronbach's α = .49) and in the HC sample was unacceptable (adolescents about mother α = .52, adolescents about father α = .48, mothers Cronbach's α = .59, fathers Cronbach's α = .44). Internal reliability of Autonomy granting in the sample with adolescents with depression was questionable to excellent

(adolescents about mother α = .91, adolescents about father α = .80, mothers α = .65, fathers α = .68) and in the HC sample was questionable to acceptable (adolescents about mother α = .72, adolescents about father α = .60, mothers α = .61, fathers α = .65).

Adolescent Psychological Disorders

The semi-structured diagnostic interview Kiddie-Schedule for Affective Disorders and Schizophrenia – Present and Lifetime (K-SADS-PL; Kaufman et al., 1996; Reichart et al., 2000) was used to diagnose adolescents' psychological disorders. The K-SADS was assessed with adolescents with depression (at that point indicated) prior to the research day by trained psychologists of the recruiting mental health care facility (i.e., diagnostic information could then be included in treatment of the adolescent; *n* = 23) or by trained researchers (*n* = 12). The K-SADS was assessed with HC adolescents during the research day. The interview was used to check in- and exclusion criteria and current comorbid disorders.

Indication of Parental Psychological Disorders

The brief Mini International Neuropsychiatric Interview (MINI, version 5.0.0; Sheehan et al., 1998) was used to indicate present and lifetime parental psychological disorders. The MINI was assessed during the research day by trained researchers. This brief interview includes semi-structured questions on (symptoms of) a variety of psychological disorders, thereby indicating possible (i.e., not diagnosing) clinical levels. In context of the current study we categorized the data as indications of current and past depressive disorders (major depressive disorder or dysthymia) and other psychological disorders.

Coding Manual – Coding Parental Autonomy Support and Psychological Control in Adolescence (CASPCA)

Concepts and Definitions

The current coding system was designed to quantify parental autonomy-supportive and psychologically controlling behaviors directed at their child (i.e., adolescents) as observed in interaction tasks. We will start this coding manual with the definitions and some theoretical background of the central concepts.

The development of autonomous functioning is considered as a crucial developmental process for adolescents (Soenens et al., 2007). Autonomy is one of the three basic psychological needs as stated in the self-determination theory (Ryan & Deci, 2000). The concept can be defined as "a sense of self-reliance, a belief one has control over his/her life, and subjective feelings of being able to make decisions without excessive social validation" (Sessa & Steinberg, 1991, p. 42). Autonomy supportive relationships are thought to encourage such self-determined functioning in adolescents and are critical for adolescents' well-being (Grolnick et al., 1991).

A parent who functions highly on autonomy-supportive behavior is both structuring and supportive and can clearly explain why certain decisions are being made by the parent, while at the same time allowing the adolescent to express his/her own opinion and feelings (Soenens & Vansteenkiste, 2010). Parental autonomy-support refers to the degree to which the parent empathizes with the child's perspective, to which there is an openness in the communication about potentially different perspectives of the parent and adolescent, and to which the parent encourages their child to take initiative and offer meaningful explanation when choice is limited (Soenens & Vansteenkiste, 2010).

Psychological control has been defined in terms of manipulation and intrusion into children's feelings and thinking through behaviors such as invalidating children's feelings and pressuring them to think in particular ways (Barber et al., 2005; Lansford et al., 2014). Psychological control can be considered a restriction of autonomy or an intrusion by parents into adolescents' establishment of autonomy (Lansford et al., 2014). Coming from the self-determination theory, parental control refers to attempts at forcing children to meet demands, solving problems for children and taking a parental rather than child's perspective (Deci & Ryan, 2000). Psychologically controlling parents regulate their child's activities, are overprotective, invalidate their child's emotions, induce guilt, and/or instruct their child how to feel, think, and behave (Donatelli et al., 2007; Elzy, 2013; Rogers et al., 2003).

Even though the concepts of parental autonomy-supportive and psychological controlling behaviors are related, several studies indicate that these concepts

must be seen as separate constructs rather than a continuum (Barber et al., 2005; Hauser Kunz & Grych, 2013). Although parents who frequently engage in psychological control are unlikely to actively promote their child's autonomy (and visa), the absence of psychological control does not imply the presence of autonomy-support. Likewise, parents who are low in autonomy-support do not by definition engage in high levels of psychological control. Rather, parents may discourage autonomous thinking and feeling explicitly by setting and reinforcing established standards for their child's behavior (i.e., behavioral control) instead of using manipulative and coercive methods (Hauser Kunz & Grych, 2013).

Interaction Tasks and Coding Procedure

With the current coding system we aim to quantify parental autonomy-support and psychological control behaviors separately in videotaped dyadic parent-adolescent interactions. A higher score represents higher levels of the particular behavior. Thus a higher score on the autonomy-support scale indicates higher levels of positive, desirable behavior, and a higher score on the psychological control scale indicates higher levels of negative, undesirable behavior. Subsequently, the construction of these two scales differs.

The coding system is applicable to three interaction tasks. Parent and adolescent are placed at a table in a 90° angle, with one camera pointed at the parent and one at the adolescent.

- Problem solving task (10 minutes): The dyad is instructed to discuss and solve a topic of discussion they have encountered in the four weeks prior to the lab visit. Parent and adolescent independently report the frequency and intensity of several possible topics of discussion via the Issues Checklist at the start of the laboratory visit. The researcher selects the three topics that were reported to be the most frequent and intense topics of discussion.
- Event planning task (6 minutes): The dyad is instructed to plan a trip (i.e., weekend) together that they would both enjoy and with an unlimited budget.
- Reminiscence task (6 minutes): The adolescent is asked to share an emotional event (reported at the start of the laboratory visit) with their parent. Preferably this concerns an event the parent has no knowledge of, and that the parent was not part of.

Adolescents participate with either one or two parents, depending on whether the second parent (1) is involved in the daily life/upbringing of the adolescent and (2) is willing to participate. If both parents participate, the adolescent will complete the interaction tasks twice; once with each parent. Thus in total there are three videotaped interactions of families in which only one parent participates, and six videotaped interactions for families with two participating parents. All families end

the interaction tasks with a Jenga task (working together to build an as high as possible Jenga tower; 10 minutes) in a triad, but the current system is not applicable to this task.

The following general coding rules should be followed:

- The autonomy-support and psychological control scales each consist of three subscales. Each subscale gets assigned one score per interaction task, next the mean is computed for the final score of autonomy-support and psychological control separately.
- The scale 'Explaining motivations' is only scored for the problem solving task, and is not applicable (NA) to the event planning or reminiscence task.
- Coding is done on a 9-point scale. The scores 1, 3, 5, 7, and 9 are described in detail below, and the scores 2, 4, 6, and 8 can be used if the behavior of the parent seems to fall in between two scores (e.g., when one element is nearly optimal, making score 5 too low, and the other element is clearly non-optimal, making score 7 too high, score 6 can be assigned).
- The coder first watches each video with regular pauses (e.g., every minute) and takes notes. A score can be assigned based on these notes. The coder should then watch the video again, without pausing it, to check whether the score indeed represents the behaviors. With this approach we aim to reduce a bias based on general feeling/likeability that may be evoked when watching the full video.
- One coder is never allowed to code the parental behavior of multiple interaction tasks, as this may lead to a bias when coding the following tasks.
- Intervision meetings will be held to discuss doubts and promote intercoder reliability.

Coding Parental Autonomy Support

I. Encouraging Input of Adolescent

This category is intended to capture the extent to which the parent encourages the input of the adolescent throughout the interaction, as expressed in two elements. First, the parent (non)verbally encourages the adolescent to give input. Second, the parent demonstrates patience.

- (Non)verbal encouragement is demonstrated by stimulating the adolescent to give input during the interaction, for example, by asking open-ended questions, providing opportunities for choices (e.g., letting adolescent decide who starts the interaction), by creating transitions if the adolescent is struggling to find input (e.g., introducing the topic or asking open or closed questions to help the adolescent getting started), or by non-verbal behavior such as facing the adolescent and nodding.

- Patience is demonstrated by not interrupting the adolescent('s thought process) and actively listening (e.g., making eye-contact and having an active posture) to the adolescent or waiting for the adolescent to give input.

9. The parent consistently encourages the adolescent's input, as observed in both elements.
- (Non)verbal encouragement is optimal.
- AND Demonstrating patience is optimal.

7. The parent in general encourages the adolescent's input, but only *one* of the elements is less optimal.
- (Non)verbal encouragement is less optimal if the parent misses some (subtle) opportunities to (non)verbally encourage the adolescent or is not able to create transitions if the adolescent struggles to find input. In those cases the parent does try to do so but the attempt does not fully fit the adolescent's mood, attention, or understanding.
- OR Demonstrating patience is less optimal if the parent, for example, in some cases interrupts the adolescent or does not wait for the adolescent to start giving input.

5. The parent encourages the adolescent's input to some extent. However, both elements are less optimal but not at the other end of the continuum.
- (Non)verbal encouragement is less optimal if the parent misses some (subtle) opportunities to (non)verbally encourage the adolescent or is not able to create transitions if the adolescent struggles to find input. In those cases the parent does try to do so but the attempt does not fully fit the adolescent's mood, attention, or understanding.
- AND Demonstrating patience is less optimal if the parent, for example, in some cases interrupts the adolescent or does not wait for the adolescent to start giving input.

3. The parent only marginally encourages the adolescent's input. The parent demonstrates the elements a few times but more often does not show these behaviors. Or one of the elements is fully absent while the other is observed to some extent.
- (Non)verbal encouragement is absent more often than it is demonstrated, if the parent (non)verbally encourages the adolescent only in some occasions.
- AND Patience is absent more often than it is demonstrated. For example, the parent may demonstrate patience after the adolescent asks for space to give input. But in general the parent interrupts the adolescent and/or is speaking a lot during the conversation.

- OR One of the elements is fully absent, while the other is observed to some extent (i.e., from marginally to optimally). For example, a parent does give quite a few verbal encouragements but never demonstrates patience, meaning the adolescent is encouraged to think about his / her own perspective, but does not get any space to express it.

1. The parent (virtually) never encourages the adolescent to give input. The parent is consistently not demonstrating both elements.

- (Non)verbal encouragement is absent if the parent does not demonstrate any encouraging behavior such as asking open-ended questions, exploring the adolescent's perspective, creating transitions, or providing a choice.
- AND Demonstrating patience is absent if the parent is either constantly interrupting the adolescent and is dominating the conversation, or not actively listening (e.g., no eye-contact and a passive posture).

II. Explaining motivations behind parental advice, limits, and perspectives

This category is intended to capture the extent to which the parent explains motivations or reasons for the advice, limits, and perspectives throughout the interaction, as expressed in two elements. First, the parent explains the motivations in a clear, calm, and respectful manner. Second, the parent takes notion of the mood, attention, and understanding of the adolescent while explaining the motivations.

- A clear, calm, and respectful manner is demonstrated by, for example, speaking with a calm tone of voice, and awareness that the motivations concern a personal perspective rather than the absolute truth.
- Taking notion of the mood, attention, and understanding of the adolescent is demonstrated by, for example, using appropriate language, asking whether the adolescent understands the parents' motivations, and changing the strategy if the adolescent is not engaged in the conversation or does not understand the content.

Note. This category is only scored when coding the problem solving task and never when coding the event planning and reminiscence task (use NA on coding form). This category is not applicable due to the nature of these tasks: The parent ideally focuses on and explores the input and emotions of the adolescent, rather than focusing on his/her own ideas. If the parent explains his/her own motivations during these tasks, this can even impair the support for autonomy.

9. The parent consistently explains motivations behind advice, limits, and perspectives suited to the situation as observed in both elements.

- Optimal demonstration of a clear, calm, and respectful manner to explain motivations.

- AND Taking notion of the mood, attention, and understanding of the adolescent is optimal.

7. The parent explains motivations behind advice, limits, and perspectives as observed in both elements, but only *one* (not both) of the elements is less optimal.

- The clear, calm, and respectful manner to explain motivations is less optimal if the parent, for example, is overdoing the explaining by repeating argumentations or elaborating too much, or is somewhat emotional in his/her argumentation. However, the parent adjusts this behavior. The adjustment is either in response to the (non)verbal reaction of the adolescent or the parent is not persistent in the unclear and/or not calm (e.g., repetitive or elaborate) manner.
- OR Taking notion of the mood, attention, and understanding of the adolescent is less optimal if the adolescent is not receptive (i.e., due to mood, attention, and/or understanding) to the explanation, and the parent does not adapt to this promptly. The parent, for example, explains his/her motivations while the adolescent expresses a negative mood (e.g., sighing or rolling with eyes). The parent focuses on his/her own motivations prior to attending to the adolescents' affective expressions, and may need some time to note and respond to the adolescents' unreceptiveness. However, the element is less optimal and not absent, thus although the parent may need some time, (s)he is able to adjust his/her behavior and explanations to the adolescent.

5. The parent explains the motivations behind advice, limits, and perspectives to some extent. However, both elements are less optimal but not at the other end of the continuum.

- The clear, calm, and respectful manner to explain motivations is less optimal if the parent, for example, is overdoing the explaining by repeating argumentations or elaborating too much, or is somewhat emotional in his/her argumentation. However, the parent adjusts this behavior. The adjustment is either in response to the (non)verbal reaction of the adolescent or the parent is not persistent in the unclear and/or not calm (e.g., repetitive or elaborate) manner.
- AND Taking notion of the mood, attention, and understanding of the adolescent is less optimal if the adolescent is not receptive (i.e., due to mood, attention, and/or understanding) to the explanation, and the parent does not adapt to this promptly. The parent, for example, explains his/her motivations while the adolescent expresses a negative mood (e.g., sighing or rolling with eyes). The parent focuses on his/her own motivations prior to attending to the adolescent's affective expressions, and may need some time to note and respond to the adolescent's unreceptiveness. However, the element is less optimal and not absent,

thus although the parent may need some time, (s)he is able to adjust his/her behavior and explanations to the adolescent.

3. The parent only marginally explains the motivations behind advice, limits, and perspectives. The parent demonstrates the elements a few times but more often does not show these elements, or barely explains any motivations behind advice, limits, and perspectives. Or one element is fully absent and the other is observed to some extent.

- The clear, calm, and respectful manner is absent more often than it is demonstrated. In some occasions the parent may explain his/her perspective in a clear, calm, and respectful manner, but more often the parent does not explain his/her perspective at all or (for example) does so in an emotional manner or presenting these explanations as the absolute truth.
- AND The parent takes no notion of the mood, attention, and understanding of the adolescent more often than he/she does take notion of this. In some occasions the parent may be attuned to the adolescent but more often the parent explains his/her motivations (for example) too elaborate or repetitive, resulting in a more plea-like or whining argumentation.
- OR One of the elements is fully absent, while the other is observed to some extent (i.e., from marginally to optimally). For example, a parent explains his/her motivations in a very clear, calm, and respectful manner, but the adolescent is not receptive to the parent's reasoning at all (e.g., rolling with eyes, sighing, showing other non-verbal disinterest) and the parent does not adapt the motivations at all.

1. The parent (virtually) never explains motivations behind advice, limits, and perspectives at all. The parent is consistently not demonstrating the elements.

- The clear, calm, and respectful manner is absent if the parent either never explains motivations behind advice, limits, and perspectives, or if the manner of explaining consistently is, for example, emotional or presented as being the absolute truth.
- AND Taking notion of the mood, attention, and understanding of the adolescent is absent if the parent either never explains the motivations or consistently does this, for example, in too elaborate or repetitive reasoning, resulting in a more plea-like or whining argumentation.

III. Receptive to expressions made by adolescent

This category is intended to capture the extent to which the parent is receptive (both verbal and nonverbal) to the adolescent's expressions (either verbal or nonverbal, affective or cognitive) during the interaction, as expressed in two

elements. First, the parent actively accepts the adolescent's expressions. And second, the parent tries to relate to and understand the adolescent's expressions.

- Active acceptance is demonstrated if the parent notices the adolescent's expressions, is tolerant, and engages in the interaction in a positive, non-defensive manner. In case of affective expressions of the adolescent, the parent empathically responds to emotions and sensitive topics and is nonverbally accepting (e.g., tone of voice, facial expression), while in case of cognitive expressions by the adolescent, the parent accepts that the adolescent has ideas and perspectives of his/her own.
- Trying to relate to and understand the adolescent's expressions is demonstrated if the parent is reflecting on (e.g., by reformulating the adolescent's expressions) and responding to the expressions (e.g., by asking in-depth questions or adding own interpretations). Furthermore, the parent allows to adolescent to express at his/her own pace, without (for example) immediately asking new questions. Concerning affective expressions, the parent relates to the emotions, rather than the situation or the topic (e.g., giving advice or asking details of more practical issues of the situation). In case of negative or ambiguous expressions the parent attends to these in an explicit manner, but in case of positive expressions (mainly during the event planning task), this may also be implicit, for example by sharing in enthusiasm.

9. The parent is consistently receptive to expressions made by the adolescent and adequately responds to them, as observed in both elements.

- The active acceptance is optimal.
- AND The attempt to relate to and understand the adolescent's expressions is optimal.

7. The parent in general is receptive to expressions made by the adolescent and adequately responds to them, but only *one* (not both) of the elements is less optimal.

- The active acceptance is less optimal if the parent is less tolerant to part of the adolescent's expressions or if the acceptance in general is less accepting. For example, the parent is not able to engage in the conversation in a fully positive and non-defensive manner. These aspects are less optimal and not absent, and do not concern a negative manner.
- OR The attempt to relate to and understand the adolescent's expressions is less optimal if the parent is less reflecting or responding. For example, the parent responds superficially rather than in-depth in some cases. Concerning negative or ambiguous emotions this can also mean the parent tries to relate to and understand them in an implicit manner, by sharing or supporting the emotions rather than further exploring them. It is important that this implicit attendance is in line with the emotions or

needs of the adolescent; the adolescent is responsive and shows signs of comfort.

5. The parent is receptive to expressions made by the adolescent and adequately responds to them to some extent, and never misses the more obvious opportunities. However, both elements are less optimal but not at the other end of the continuum.

- The active acceptance is less optimal if the parent is less tolerant to part of the adolescent's expressions or if the acceptance in general is less accepting. For example, if the parent is not able to engage in the interaction in a fully positive and non-defensive manner. These aspects are less optimal and not absent and do not concern a negative manner.
- AND The attempt to relate to and understand the adolescent's expressions is less optimal if the parent is less reflecting or responding. For example, the parent responds superficially rather than in-depth in some cases. Concerning negative or ambiguous emotions this can also mean the parent tries to relate to and understand them in an implicit manner, by sharing or supporting the emotions rather than further exploring them. It is important that this implicit attendance is in line with the emotions or needs of the adolescent; the adolescent is responsive and shows signs of comfort.

3. The parent is only marginally receptive to expressions made by the adolescent. The parent demonstrates the elements a few times but more often does not show these elements. Or one element is absent and the other is observed to some extent.

- In some occasions the parent may actively accept the adolescent's expressions, but more often the parent is not reacting to or even rejecting, verbally or nonverbally (e.g., gruff or cynical tone of voice or facial expression) the adolescent's expressions.
- AND The attempt to relate to and understand the adolescent's expressions is more often absent than demonstrated by the parent. In some occasions the parent may, explicitly or implicitly, relate to and understand the adolescent's expressions, but more often the parent (for example) does not further explore the expressions. Or, in case of emotional behavior or content, focuses on practical aspects of the situation or advices the adolescent.
- OR One of the elements is fully absent, while the other is observed to some extent (i.e., from marginally to optimally). For example, a parent who actively accepts all or most of the adolescent's expression, but never attempts to relate to or understand them.

1. The parent is (virtually) never receptive to expressions made by the adolescent. The parent is consistently not demonstrating the elements.

- The active acceptance is absent if the parent does not notice the expressions (i.e., as far as this can be observed by the coder) or does not attend to them, but rather, for example, ignores them, 'correcting' the adolescent a lot, or elaborates on his/her own perspectives.
- AND The attempt to relate to and understand the expressions is absent if the parent does not try to further explore adolescent's expressions, but is rather, for example, consistently interrupting the adolescent, very impatient if the adolescent tries to express his/her affections or cognitions, or is changing the topic.

Coding Parental Psychological Control

I. Constraining verbal expressions

This category is intended to capture the extent to which the parent is constraining verbal expressions of the adolescent throughout the interaction, as expressed in three elements. First, the parent demonstrates dominating behaviors. Second, the content of the parents' expressions is dominant. And third, the parent demonstrates disinterest.

- Dominant behavior is demonstrated if the parent shows behaviors that interfere with the adolescent or otherwise restrict the adolescent to express. Examples are asking leading questions, interrupting the adolescent, speaking a lot during the interaction an thereby restricting the adolescent to express, answering their own questions, speaking for the other, or switching topics.
- Dominant content is demonstrated if the verbal expressions of the parent have a leading content, leaving no space for expressions or reasoning of the adolescent. Examples of such dominating content are 'should/ought statements', lecturing, advising, and suggesting solutions.
- Disinterest means the parent is ignoring the adolescent's comment or non-verbally communicating disinterest (e.g., facing away from the adolescent aiming to ignore the adolescent).

Low intensity episodes:

- Dominating behavior. The parent has a somewhat dominant attitude and tone of voice.
- Dominating behavior. While speaking, the parent does not allow the adolescent to interrupt him/her, because he/she wants to elaborate on his/her own point. The parent had already allowed the adolescent to express his/her thoughts or feelings, but next is speaking for quite some time and then does not allow the adolescent to interrupt/take over.
- Dominating content. The parent is overdoing the explanation of motivations, resulting in a mild form of lecturing.

- Dominating content. The parent keeps track on his/her own reasoning or suggestions. The parent listens to the adolescent but next elaborates on his/her own reasoning.
- Dominating content. The parent is somewhat leading in the content of the interaction, but the parent is able to adjust this to the adolescents' input relatively quickly.
- Dominating content. The parent suggests solutions to the discussed situation (advising/wanting to solve a situation for the adolescent), after first exploring the adolescent's perception. The solutions are suggestive rather than compelling, but the adolescent did not ask the parent to think about a possible solution nor is (s)he receptive to the suggested solution.
- Disinterest. The parent initially ignores the adolescent's suggestions, but reacts to these suggestions at a later moment out of own motivation.

Mild intensity episodes:

- Dominating behavior. The parent abruptly interrupts the adolescent or switches topic, in a non-pressuring and brief manner.
- Dominating behavior. While speaking, the parent does not allow the adolescent to interrupt him/her, because he/she wants to elaborate on his/her own point. This behavior is scored as a mild intensity episode if the parent is rather leading in the conversation. Meaning the parent has already been speaking for quite some time or the adolescent has not yet had a chance to speak up to the moment the adolescent tries to interrupt the parent. However, after a reasonable while (e.g., finishing the sentence), the parent does encourage or allow the adolescent to give input.
- Dominating content. The parent does listen to the ideas of the adolescent (e.g., where to go during event planning interaction), adds own ideas, and chooses one of the proposed ideas themselves rather than letting the adolescent or mutually decide.
- Dominating content. The parent suggests solutions to the discussed situation (advising/wanting to solve a situation for the adolescent), without first exploring the adolescents' perception. The solutions are suggestive rather than compelling, and the adolescent did not ask the parent to think about a possible solution nor is (s)he receptive to the suggested solution.
- Dominating content. Keeping track on one's own reasoning. The parent listens to the adolescent but next elaborates on their own reasoning. Furthermore, the parent is advising, lecturing, or setting boundaries in this elaboration.
- Disinterest. The parent initially ignores the adolescent's suggestions, but reacts to these suggestions if the adolescent keeps repeating them.

Moderate intensity episodes:

- Dominating behavior. The parent abruptly interrupts the adolescent or switches the topic (e.g., by shushing the adolescent). This behavior occurs in a pressuring and leading manner. However, the parent does not cross an emotional/vulnerable moment of the adolescent or a sensitive topic.
- Dominating behavior. While speaking, the parent does not allow the adolescent to interrupt him/her, because he/she want to elaborate on his/her own point. The parent is leading in the interaction: the adolescent has not yet had a chance to express his/her thoughts or feelings, and the parent has been speaking for quite some time. Furthermore, the parent does not stop their own reasoning within a reasonable timeframe to let the adolescent express his/her thoughts or feelings.
- Dominating content. The parent suggests solutions to the discussed situations (advising/wanting to solve a situation for the adolescent), without first exploring the adolescent's perception. Furthermore, the solutions are presented compelling rather than suggestive, and the adolescent did not ask the parent to think about a possible solution nor is (s)he receptive to the suggested solution.
- Disinterest. The parent ignores suggestions of the adolescent, neither reacts to them (out of own motivation or because of repetition adolescent) at a later moment.

Strong intensity episodes:

- Dominating behavior. The parent abruptly interrupts the adolescent. This behavior occurs in a pressuring and leading manner, and the parent crosses an emotional/vulnerable moment of the adolescent or a sensitive topic.
- Dominating content. The parent suggests solutions to the discussed situations (advising/wanting to solve a situation for the adolescent), without first exploring the adolescents' perception, and the adolescent did not ask the parent to think about a possible solution nor is (s)he receptive to the suggested solution.. Furthermore, the solutions are presented compelling rather than suggestive and the parent keeps pressuring on these solutions (high and persistent level of leading content).

9. The parent:

- Consistently constraint the adolescent's verbal expressions, many parental behaviors contain some type of constraining (low, mild, and/or moderate intensity).
- AND Demonstrates one or several strong intensity episodes occur.

7. The parent:
   - Frequently demonstrates low, mild, and/or moderate intensity constraining episodes
   - AND/OR Demonstrates one or more strong intensity constraining episodes.

5. The parent:
   - Demonstrates infrequent mild intensity episodes.
   - AND/OR Demonstrates one brief moderate intensity episode.

3. The parent demonstrates infrequent low intensity episodes.

1. The parent never constrains the adolescents' verbal expressions.

II. Guilt induction

This category is intended to capture the extent to which the parent is demonstrating guilt inducing behaviors (i.e., attempts to force behaviors and thoughts) throughout the interaction, as expressed in two elements. First, the parent is making the adolescent unreasonably responsible. And second, the parent is prioritizing his/her own perspectives and needs.

- Making the adolescent unreasonably responsible is demonstrated if the parent is making the adolescent responsible for a situation that is hard to resolve. Pointing out the responsibility of the adolescent is making the adolescent responsible but not necessarily negative, guilt inducing behavior. However, it *is* coded if the parent is making the adolescent responsible for a situation the adolescent is not actually responsible for, or cannot resolve. This concerns behaviors that are within the relationship between parent and adolescent (e.g., conflict between parents about how to raise the adolescent) and *not* if it concerns a reasonable responsibility (e.g., making the adolescent responsible for a mess (s)he did not actually make).
- Prioritizing own perspectives and needs is demonstrated if the parent is placing his/her own perspectives and needs above those of the adolescent; the adolescent's behavior/feelings are bothering the parent. This concerns behaviors that are within the relationship between parent and adolescent and *not* if it concerns more practical aspects (e.g., choosing where to go without exploring the adolescent's perspective during the Event planning interaction). For example, by pointing out the parent has suffered a lot for the adolescent, mirroring the adolescent's problems to those of the parent (i.e., pointing out own problems are worse than those of the adolescent), or not allowing the adolescent to express emotions because the parent is emotional him/herself.

Low intensity episodes:

- Making the adolescent unreasonably responsible. The parent describes a situation resulting in a responsibility placed by the adolescent; this parental behavior occurs in a brief and calm (i.e., no emotional tone of voice or attitude) manner.
- Prioritizing own perspectives and needs. The parent describes a situation or behaves in a way that places his/her own perspectives and needs above those of the adolescent; this parental behavior occurs in a brief and calm (i.e., no emotional tone of voice or attitude) manner.

Mild intensity episodes:

- Making the adolescent unreasonably responsible. The parent describes a situation resulting in a responsibility placed by the adolescent; this parental behavior occurs in a brief and somewhat emotional (i.e., tone of voice or attitude) manner.
- Prioritizing own perspectives and needs. The parent describes a situation or behaves in a way that places his/her own perspectives and needs above those of the adolescent; this parental behavior occurs in a brief and somewhat emotional (i.e., tone of voice or attitude) manner.

Moderate intensity episodes:

- Making the adolescent unreasonably responsible. The parent describes a situation resulting in a responsibility placed by the adolescent; this parental behavior occurs in a somewhat pressuring and clearly emotional (i.e., tone of voice or attitude) manner.
- Prioritizing own perspectives and needs. The parent describes a situation or behaves in a way that places his/her own perspectives and needs above those of the adolescent; this parental behavior occurs in a somewhat pressuring and clearly emotional (i.e., tone of voice or attitude) manner.

Strong intensity episodes:

- Making the adolescent unreasonably responsible. The parent describes a situation resulting in a responsibility placed by the adolescent; this parental behavior occurs in a clearly pressuring and emotional (i.e., tone of voice or attitude) manner.
- Prioritizing own perspectives and needs. The parent describes a situation or behaves in a way that places his/her own perspectives and needs above those of the adolescent; this parental behavior occurs in a clearly pressuring and emotional (i.e., tone of voice or attitude) manner.

9. The parent:
- Consistently demonstrates guilt inducing behaviors, many parental behaviors contain some type of guilt induction (low, mild, and/or moderate intensity).
- AND Demonstrates one or several strong intensity episodes occurs.

7. The parent:
- Frequently demonstrating low, mild, and/or moderate intensity guilt inducing episodes.
- AND/OR Demonstrates one or more strong intensity guilt inducing episodes.

5. The parent:
- Demonstrates infrequent mild intensity episodes.
- AND/OR Demonstrates one brief moderate intensity episodes.

3. The parent demonstrates infrequent low intensity episodes.

1. The parent never demonstrates guilt inducing behaviors.

III. Invalidating emotions

This category is intended to capture the extent to which the parent is demonstrating behaviors that invalidate the adolescent's emotions, as expressed in three elements. First, the parent demonstrates nonverbal signs that invalidate the adolescents' emotions. Second, the parent assigns values to adolescent's emotions. And third, the parent is minimalizing the adolescent's emotions.

- Assigning values to emotions is demonstrated if the parent is filling in emotions for the adolescent (e.g., via mind-reading behaviors) or is stating that emotions have a certain value (e.g., wrong, incorrect, not normal, unimportant, weak).
- Minimalizing is demonstrated if the parent shows behavior (verbally or nonverbally) that (aims to) diminishes the adolescent's emotions (e.g., stating the other is overreacting, stating the adolescent should forget about it and move on, minimalized enthusiasm of the adolescent by being flat/discouraging, ignoring the content, rolling eyes, tone of voice, sighing, or expressing positive feelings about a situation the adolescent has expressed to experience as negative).

Low intensity episodes:
- Minimalizing and nonverbal signs. The parent has a very flat, discouraging attitude or tone of voice at a moment of enthusiasm of the adolescent.
- Minimalizing. The parent ignores specific content of the adolescent. For example, by discussing practical aspects after an emotional expression of the adolescent.

Mild intensity episodes:

- Assigning values to emotions. The parent is filling in the emotions of the adolescent (i.e., mind reading) in a suggestive, non-pressuring, and brief manner. The parent does not check whether this fits the adolescent's actual emotions. If the parent *does* check the adolescent's perception/actual experience/emotions, the behavior is not coded here, because the behavior then promotes the exploration of the adolescents' emotions.

Moderate intensity episodes:

- Assigning values to emotions. The parent is filling in the emotions of the adolescent (i.e., mind reading) in a certain context or situation, in a rather firm/direct, but non-pressuring and brief manner. The parent does not check whether this fits the adolescent's actual emotions.
- Minimalizing. The parent states he/she has positive feelings about a situation or moment after the adolescent has said he/she has negative feelings about that situation or moment.

Strong intensity episodes:

- Assigning values to emotions. The parent is filling in the emotions of the adolescent (i.e., mind reading) in a certain context or situation, in a rather firm/direct, pressuring, and leading manner. The parent does not check whether this fits the adolescents' actual emotions.

9. The parent:

- Consistently invalidates the adolescent's emotions. Many parental behaviors contain some type of invalidating emotions (low, mild, and/or moderate intensity).
- AND Demonstrates one or several strong intensity episodes occur.

7. The parent:

- Frequently demonstrates low, mild, and/or moderate intensity behaviors that invalidate the adolescent's emotions.
- AND/OR Demonstrates one or more strong intensity episodes of invalidating emotions.

5. The parent:

- Demonstrates infrequent mild intensity episodes.
- AND/OR Demonstrates one brief moderate intensity episodes.

3. The parent demonstrates infrequent low intensity episodes.

1. The parent never demonstrates behaviors that invalidate the adolescent's emotions.

PPN #

Coding Form

Task	PSI/EPI/REM	**Coder**	
Task as instructed?	Yes / Partly / Not at all	**Date**	

Autonomy-supportive behaviors	**Score**	**Notes**
I. Encouraging input		
II. Explaining motivations		
III. Receptive to expressions		
Psychologically controlling behaviors	**Score**	**Notes**
I. Constraining verbal expressions		
II. Guilt induction		
III. Invalidating feelings		

Element	**Notes**
Autonomy-Support	
(Non) verbal encouragement	
Patience	
Clear, calm, respectful	
Adjusted to adolescent	
Active acceptance	
Relating, understanding	
Psychological Control	
Dominating behavior	
Dominating content	
Disinterest	
Unreasonable responsibility	
Prioritizing own perspective	
Assigning values	
Minimalizing	

Time	Relevant behaviors
Start fragment	

Supplementary Table 1

Subscales Coding System and Related Behaviors from Previous Studies

Current coding system	Based on
Parental Autonomy Support	
Encouraging input	Queries of other which are truly information seeking (Allen, Hauser, Eickholt, et al., 1994) Engaged interaction (Allen, Hauser, Eickholt, et al., 1994) Encourages child to express views (Hauser Kunz & Grych, 2013) Encourages independent thinking (Hauser Kunz & Grych, 2013) Provision of choice (Mageau et al., 2016; Wuyts et al., 2018) Asking experience questions (Wuyts et al., 2018) Authentic interest (Wuyts et al., 2018) Awaiting [disclosure] (Wuyts et al., 2018)
Explaining motivations	Tolerates differences and disagreements (Hauser Kunz & Grych, 2013) Provision of rationale for rules and demands (Mageau et al., 2016)
Receptiveness to input	Queries of other which are truly information seeking (Allen, Hauser, Eickholt, et al., 1994) Receptive to statements made by child (Allen, Hauser, Eickholt, et al., 1994; Hauser Kunz & Grych, 2013) Tolerates differences and disagreements (Hauser Kunz & Grych, 2013) Acknowledgement of child's feelings (Mageau et al., 2016) Reflective listening (Wuyts et al., 2018) Empathic understanding (Wuyts et al., 2018)
Parental Psychological Control	
Constraining expressions	Pressures other to agree (Allen, Hauser, Eickholt, et al., 1994; Mageau et al., 2016) Distracting/ignoring/interrupting (Allen, Hauser, Eickholt, et al., 1994; Wuyts et al., 2018) Constrain verbal expressions (Barber, 1996) Closed questioning (Wuyts et al., 2018) Using controlling language (Wuyts et al., 2018) Commanding (Wuyts et al., 2018) Unsolicited advising or lecturing (Wuyts et al., 2018) Intrusive questioning and showing mistrust (Wuyts et al., 2018) Predominant parental Talking (Wuyts et al., 2018)

Supplementary Table 1 Continued

Current coding system	Based on
Guilt induction	Pressures other to agree (Allen, Hauser, Eickholt, et al., 1994; Mageau et al., 2016) Showing disappointment and guilt inducing criticism (Barber, 1996; Mageau et al., 2016; Wuyts et al., 2018)
Invalidating feelings	Hostile or devaluing statement toward other (Allen, Hauser, Eickholt, et al., 1994) Invalidating feelings (Barber, 1996) Criticizing and expressing disapproval (Wuyts et al., 2018)

Note. Studies by Allen et al. (1994), Barber (1996), Hauser Kunz & Grych (2013), and Wuyts et al. (2018) included coding of parental autonomy support and/or psychological control. Study by Mageau et al. (2016) included child-reports of parental autonomy support. Love withdrawal is not included as it was difficult to observe in interaction tasks.

Supplementary Table 2

Bivariate Correlations of Main Variables per Group

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. AS PSI		.31*	.46**	-.69**	-.16	-.41**	.22	.23	.33**	-.02	.10	-.08	.18	.28*
2. AS EPI	.17*		.16	-.21	-.67**	.02	-.01	.24	.14	-.03	-.01	.06	-.01	.09
3. AS REM	.31**	.24**		-.56**	-.10	-.72**	.23	.22	.26*	-.12	.20	-.04	.16	.17
4. PC PSI	-.69**	-.08	-.13		.08	.58**	-.32*	-.36**	-.33**	.29*	.06	.27*	-.19	-.25
5. PC EPI	-.02	-.63**	-.18*	.11		-.01	.03	-.09	-.01	.02	-.01	-.05	.02	-.001
6. PC REM	-.26**	-.27**	-.51**	.15	.27**		-.37**	-.33**	-.41*	.25	-.16	.13	-.42**	-.41**
7. L/U PSI	.09	.12	.16	-.06	.02	-.04		.75**	.73**	-.68**	-.49**	-.554**	.42**	.22
8. L/U EPI	.01	.16	.05	.00	-.11	-.06	.56**		.79**	-.60**	-.60**	-.55**	.44**	.41**
9. L/U REM	-.05	.08	.12	.10	.06	-.07	.68**	.53**		-.47**	-.38**	-.62**	.32*	.25
10. C/D PSI	-.13	-.02	-.05	.06	.04	-.06	-.51**	-.25**	-.25**		.73**	.56**	-.35**	-.09
11. C/D EPI	.05	-.06	.08	.01	.18*	-.01	-.22**	-.36**	-.23	.48**		.59**	-.25	-.05
12. C/D REM	-.01	-.003	-.12	-.08	.06	.07	-.28**	-.21*	-.42**	.49**	.60**		-.24	-.03
13. PA PSI	.01	-.05	.02	.02	.10	-.13	.41**	.25**	.33**	-.28**	-.15	-.16		.79**
14. PA EPI	.002	-.03	.08	.08	.11	-.03	.32**	.27**	.34**	-.20*	-.16	-.13	.67**	
15. PA REM	-.11	-.10	.13	.13	.12	.08	.28**	.36**	.33**	-.15	-.22*	-.14	.61**	.55**
16. NA PSI	.10	.08	-.05	-.05	-.06	-.04	-.52**	-.31**	-.49**	.25**	.23**	.32**	-.45**	-.30**
17. NA EPI	.13	.03	-.06	-.06	-.07	-.03	-.30**	-.21*	-.40**	.15	.25**	.23**	-.27**	-.33**
18. NA REM	.15	.06	-.09	-.09	-.06	-.08	-.25**	-.29**	-.34**	.13	.22**	.25**	-.33**	-.27**

Note. AS = observed parental autonomy support; PC = observed parental psychological control; L/U = adolescent-perceived parental listening and understanding; C/D = adolescent-perceived parental criticism and dominance; PSI = problem solving interaction task; EPI = event planning interaction task; REM = reminiscence interaction task; PA = positive affect; NA = negative affect. Bivariate correlations of families with healthy control adolescent are presented below the diagonal, bivariate correlations families with an adolescent with current MDD/dysthymia are presented above the diagonal.

* $p < .05$; ** $p < .01$

Supplementary Table 2 Continued

Variable	15.	16.	17.	18.
1. AS PSI	.18	.002	-.10	-.04
2. AS EPI	.11	.10	-.03	-.06
3. AS REM	.06	-.07	-.09	-.10
4. PC PSI	-.13	.08	.14	.06
5. PC EPI	-.13	-.02	.01	.09
6. PC REM	-.41**	.13	.13	.20
7. L/U PSI	.25*	-.62**	-.53**	-.51**
8. L/U EPI	.26*	-.53**	-.61**	-.56**
9. L/U REM	.31*	-.45**	-.44**	-.50**
10. C/D PSI	-.15	.52**	.33**	.39**
11. C/D EPI	-.06	.52**	.44**	.38**
12. C/D REM	-.12	.57**	.34**	.40**
13. PA PSI	.74**	-.61**	-.58**	-.55**
14. PA EPI	.71**	-.30*	-.55**	-.41**
15. PA REM		-.34**	-.40**	-.53**
16. NA PSI	-.39**		.75**	.77**
17. NA EPI	-.39**	.62**		.75**
18. NA REM	-.57**	.53**	.63**	

Note. AS = observed parental autonomy support; PC = observed parental psychological control; L/U = adolescent-perceived parental listening and understanding; C/D = adolescent-perceived parental criticism and dominance; PSI = problem solving interaction task; EPI = event planning interaction task; REM = reminiscence interaction task; PA = positive affect; NA = negative affect. Bivariate correlations of families with healthy control adolescent are presented below the diagonal, bivariate correlations families with an adolescent with current MDD/dysthymia are presented above the diagonal.

* $p < .05$; ** $p < .01$

Supplementary Table 3

Model Fit Statistics Multilevel Analyses Part 1 (H1.1-4)

					Anova for model fit improvement			
	Obs.	LL	AIC	BIC	Comparing	χ^2	df	*p*
Type of task > Observed AS								
a. Unconditional model individual (model 1a)	442	-618.56	1243.1	1255.4				
b. Unconditional model individual and family (model 1b)	442	-614.32	1236.7	1253.0	1a and 1b	8.48	1	.004
c. Type of task (EPI, REM) model (**model 2**)	442	-600.19	1212.4	1236.9	1b and 2	28.27	2	<.001
d. Type of task and random slope (EPI) model (model 3a)	442	-599.29	1218.6	1259.5	2 and 3a	1.80	4	.773
e. Type of task and random slope (REM) model (model 3b)	442	-599.49	1219.0	1259.9	2 and 3b	1.40	4	.844
f. Type of task and covariates model (model 4)	442	-599.23	1216.5	1253.3	2 and 4	1.92	3	.589
Type of task > Observed PC								
a. Unconditional model individual (model 1a)	442	-623.67	1253.3	1265.6				
b. Unconditional model individual and family (model 1b)	442	-623.12	1254.2	1270.6	1a and 1b	1.10	1	.294
c. Type of task (EPI, REM) model (**model 2**)	442	-606.81	1225.6	1250.2	1b and 2	32.63	2	<.001
d. Type of task and random slope (EPI) model (model 3a)	442	-604.84	1229.7	1270.6	2 and 3a	3.925	4	.416
e. Type of task and random slope (REM) model (model 3b)	442	-606.81	1232.0	1272.9	2 and 3b	1.603	4	.808
f. Type of task and covariates model (model 4)	442	-606.66	1231.3	1268.1	2 and 4	0.29	3	.961
Type task > L/U								
a. Unconditional model individual (model 1a)	437	-571.52	1149.0	1161.3				
b. Unconditional model individual and family (model 1b)	437	-565.33	1138.7	1155.0	1a and 1b	12.38	1	<.001
c. Type of task (EPI, REM) model (model 2)	437	-530.05	1072.1	1096.6	1b and 2	70.56	2	<.001
d. Type of task and random slope (EPI) model (model 3a)	437	-523.52	1067.0	1107.8	2 and 3a	13.06	4	.011
e. Type of task and random slope (REM) model (model 3b)	437	-526.54	1073.1	1113.9	2 and 3b	7.02	4	.135
f. Type of task, random slope (EPI), and all covariates model (model 4a)[a]	437	-519.09	1064.2	1117.2	3a and 4a	8.86	3	.031
g. Type of task, random slope (EPI), and covariate (biological sex parent) model (**model 4b**)	437	-520.33	1062.7	1107.5	3a and 4b	6.38	1	.012

Supplementary Table 3 Continued

	Obs.	LL	AIC	BIC	Anova for model fit improvement Comparing	χ^2	df	*p*
Type task > C/D								
a. Unconditional model individual (model 1a)	437	-597.17	1200.3	1212.6				
b. Unconditional model individual and family (model 1b)	437	-583.13	1174.3	1190.6	1a and 1b	28.08	1	<.001
c. Type of task (EPI, REM) model (model 2)	437	-513.84	1039.7	1064.2	1b and 2	138.6	2	<.001
d. Type of task and random slope (EPI) model (model 3a)	437	-512.45	1044.9	1085.7	2 and 3a	2.78	4	.596
e. Type of task and random slope (REM) model (model 3b)	437	-513.46	1046.9	1087.7	2 and 3b	0.75	4	.945
e. Type of task and covariates model (**model 4**)	437	-508.73	1035.5	1072.2	2 and 4	10.22	3	.017
AS -> L/U								
a. Unconditional model individual (model 1a)	437	-571.52	1149.0	1161.3				
b. Unconditional model individual and family (model 1b)	437	-565.33	1138.7	1155.0	1a and 1b	12.38	1	<.001
c. AS model (model 2)	437	-558.70	1127.4	1147.8	1b and 2	13.26	1	<.001
d. AS and random slope model (model 3)	437	-558.49	1135.0	1171.0	2 and 3	0.41	4	.982
e. AS and type of task (EPI, REM) model (model 4)	437	-528.20	1070.4	1099.0	2 and 4	61.00	2	<.001
f. AS*type of task model (model 5)	437	-527.63	1073.3	1110.0	4 and 5	1.14	2	.567
g. AS, type of task and covariates model (**model 6**)	437	-523.19	1066.4	1107.2	4 and 6	10.01	3	.018
AS -> C/D								
a. Unconditional model individual (model 1a)	437	-597.17	1200.3	1212.6				
b. Unconditional model individual and family (model 1b)	437	-583.13	1174.3	1190.6	1a and 1b	28.08	1	<.001
c. AS model (model 2)	437	-571.09	1152.2	1172.6	1b and 2	24.09	1	<.001
d. AS and random slope model (model 3)	437	-570.37	1158.8	1195.5	2 and 3	1.43	4	.839
e. AS and type of task (EPI, REM) model (model 4)	437	-508.80	1031.6	1060.2	2 and 4	124.58	2	<.001
f. AS*type of task model (model 5)	437	-508.56	1035.1	1071.8	4 and 5	0.47	2	.789
g. AS, type of task and covariates model (**model 6**)	437	-503.84	1027.7	1068.5	4 and 6	9.92	3	.019
PC -> L/U								
a. Unconditional model individual (model 1a)	437	-571.52	1149.0	1161.3				

b. Unconditional model individual and family (model 1b)	437	-565.33	1138.7	1155.0	1a and 1b	12.38	1	<.001
c. PC model (model 2)	437	-555.46	1120.9	1141.3	1b and 2	19.74	1	<.001
d. PC and random slope model (model 3)	437	-555.46	1128.6	1165.3	2 and 3	0.33	4	.988
e. PC and type of task (EPI, REM) model (model 4)	437	-527.15	1068.3	1096.9	2 and 4	56.62	2	<.001
f. PC*type of task model (model 5)	437	-526.31	1070.6	1107.3	4 and 5	1.67	2	.434
g. PC, type of task and covariates model (**model 6**)	437	-521.86	1063.7	1104.5	4 and 6	10.58	3	.014
PC -> C/D								
a. Unconditional model individual (model 1a)	437	-597.17	1200.3	1212.6				
b. Unconditional model individual and family (model 1b)	437	-583.13	1174.3	1190.6	1a and 1b	28.08	1	<.001
c. PC model (model 2)	437	-569.62	1149.2	1169.6	1b and 2	27.03	1	<.001
d. PC and random slope model (model 3)	437	-568.75	1155.5	1192.2	2 and 3	1.75	2	.781
e. PC and type of task (EPI, REM) model (model 4)	437	-509.91	1033.8	1062.4	2 and 4	119.43	2	<.001
f. PC*type of task model (model 5)	437	-509.14	1036.3	1073.0	4 and 5	1.54	2	.464
g. PC, type of task and covariates model (**model 6**)	437	-504.57	1029.2	1070.0	4 and 6	10.67	3	.014
AS -> Positive affect								
a. Unconditional model individual (model 1a)	437	-570.16	1146.3	1158.6				
b. Unconditional model individual and family (model 1b)	437	-552.45	1112.9	1129.2	1a and 1b	35.42	1	<.001
c. AS model (model 2)	437	-551.94	1113.9	1134.3	1b and 2	1.02	1	.312
d. AS and random slope model (model 3)	437	-551.79	1121.6	1158.3	2 and 3	0.31	4	.989
e. AS and type of task (EPI, REM) model (model 4)	437	-511.35	1036.7	1065.2	2 and 4	81.19	2	<.001
f. AS*type of task model (model 5)	437	-506.35	1030.7	1067.4	4 and 5	9.99	2	.007
g. AS*type of task, and pre-task affect model (**model 6**)[a]	434	-502.51	1025.0	1065.7	5 and 6	1.875	1	.171
h. AS*type of task, pre-task affect, and covariates model (model 7)	434	-500.47	1026.9	1079.9	5 and 6	4.071	3	.254
AS -> Negative affect								
a. Unconditional model individual (model 1a)	437	-581.27	1168.5	1180.8				
b. Unconditional model individual and family (model 1b)	437	-560.98	1130.0	1146.3	1a and 1b	40.57	1	<.001
c. AS model (model 2)	437	-560.94	1131.9	1152.3	1b and 2	0.07	1	.785
d. AS and random slope model (model 3)	437	-560.25	1138.5	1175.2	2 and 3	1.39	4	.845

Supplementary Table 3 Continued

					Anova for model fit improvement			
	Obs.	LL	AIC	BIC	Comparing	Obs.	LL	AIC
AS -> Negative affect								
e. AS and type of task (EPI, REM) model (**model 4**)	437	-534.63	1083.2	1111.8	2 and 4	52.63	2	<.001
f. AS*type of task model (model 5)	437	-534.02	1086.0	1122.8	4 and 5	1.21	2	.545
g. AS, type of task, and pre-task affect model (model 6)[a]	434	-528.25	1072.5	1105.1	4 and 6	2.637	1	.104
g. AS, type of task, pre-task affect, and covariates model (model 7)	434	-524.49	1071.0	1115.8	6 and 7	7.525	3	.057
PC -> Positive affect								
a. Unconditional model individual (model 1a)	437	-570.16	1146.3	1158.6				
b. Unconditional model individual and family (model 1b)	437	-552.45	1112.9	1129.2	1a and 1b	35.42	1	<.001
c. PC model (model 2)	437	-552.36	1114.7	1135.1	1b and 2	0.17	1	.674
d. PC and random slope model (model 3)	437	-547.47	1113.0	1149.7	2 and 3	9.78	4	.044
e. PC, random slope and type of task (EPI, REM) model (model 4)	437	-504.85	1031.7	1076.6	3 and 4	85.24	2	<.001
f. PC*type of task and random slope model (model 5)	437	-502.22	1030.4	1083.5	4 and 5	5.27	2	.072
g. PC, random slope, type of task, and pre-task affect model (**model 6**)[b]	434	-498.77	1021.5	1070.4	4 and 6	5.320	1	.021
g. PC, random slope, type of task, pre-task affect, and covariates model (model 7)	434	-496.52	1023.0	1084.1	6 and 7	4.499	3	.212
PC -> Negative affect								
a. Unconditional model individual (model 1a)	437	-581.27	1168.5	1180.8				
b. Unconditional model individual and family (model 1b)	437	-560.98	1130.0	1146.3	1a and 1b	40.57	1	<.001
c. PC model (model 2)	437	-560.98	1132.0	1152.4	1b and 2	0.0002	1	.988
d. PC and random slope model (model 3)	437	-560.50	1139.0	1175.7	2 and 3	0.961	4	.916
e. PC and type of task (EPI, REM) model (model 4)	437	-534.77	1083.5	1112.1	2 and 4	52.43	2	<.001
f. PC*type of task model (model 5)	437	-534.27	1086.5	1123.2	4 and 5	1.004	2	.605
g. PC, type of task, and pre-task affect model (model 6)[b]	434	-528.35	1072.7	1105.3	4 and 6	2.616	1	.106
h. PC, type of task, pre-task affect, and covariates model (**model 7)**	434	-524.51	1071.0	1115.8	6 and 7	7.685	3	.053

AS -> L/U daily life								
a. Unconditional model family (model 1)	142	-185.40	376.80	385.67				
b. AS model (**model 2**)	142	-184.29	376.57	388.40	1 and 2	2.227	1	.136
c. AS and covariates model (model 3)	142	-182.12	378.24	398.93	2 and 3	4.330	3	.228
AS -> C/D daily life								
a. Unconditional model family (model 1)	142	-187.47	380.95	389.82				
b. AS model (**model 2**)	142	-187.26	382.53	394.35	1 and 2	0.422	1	.516
c. AS and covariates model (model 3)	142	-185.66	385.31	406.00	2 and 3	3.215	3	.360
PC -> L/U daily life								
a. Unconditional model family (model 1)	142	-185.40	376.80	385.67				
b. PC model (**model 2**)	142	-182.35	372.69	384.52	1 and 2	6.107	1	.013
c. PC and covariates model (model 3)	142	-179.72	373.43	394.13	2 and 3	5.258	3	.154
PC -> C/D daily life								
a. Unconditional model family (model 1)	142	-187.47	380.95	389.82				
b. PC model (**model 2**)	142	-186.85	381.71	393.53	1 and 2	1.239	1	.266
c. PC and covariates model (model 3)	142	-185.20	384.39	405.09	2 and 3	3.315	3	.346

Note. AS = parental autonomy support; PC = parental psychological control; L/U = parental listening and understanding; C/D parental criticism and dominance; PSI = problem solving interaction task; EPI = event planning interaction task; REM = reminiscence interaction task. Covariates: parental sex, adolescent sex and age. Sex: 0 = female, 1 = male. Type of task model: dummy coding with PSI as reference category.

[a] Model did run, but an error appeared warning for the complexity of the model given the number of parameters relative to the number of observations. We decided to run the model again, only including the significant covariate, and dropping other covariates to enhance simplicity and thereby stability of the model.

[b] Model fit comparison could not run on model 5 and 6 with adolescent affect as the dependent variable, because of missing data for pre-task affect (*n* = 3 observations). In order to compute model fit statistics in comparing model 5 and 6 with adolescent affect as the dependent variable, cases with missing data for pre-task affect were excluded in the comparison of these models.

Supplementary Table 4

Results Multilevel Analyses on the Effect of Type of Task on Observed AS and PC (H1.1), and Perceived L/U and C/D (H1.2)

	Observed AS		Observed PC		Perceived L/U		Perceived C/D	
	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*
Fixed effects								
Intercept	-0.256 (0.086)	.003	0.345 (0.082)	<.001	-0.500 (0.106)	<.001	0.388 (0.898)	.667
Type of task								
EPI v. PSI	0.262 (0.099)	.009	-0.543 (0.103)	<.001	0.566 (0.075)	<.001	-0.836 (0.074)	<.001
REM v. PSI	0.541 (0.099)	<.001	-0.504 (0.103)	<.001	0.578 (0.072)	<.001	-0.885 (0.075)	<.001
REM v. EPI[a]	0.279 (0.099)	.005	0.039 (0.103)	.708	0.010 (0.069)	.924	-0.049 (0.075)	.513
Biological sex parent					0.256 (0.097)	.010	-0.188 (0.079)	.021
Biological sex adolescent							-0.355 (0.160)	.029
Age adolescent							0.032 (0.057)	.582
Random effects								
Between person variance	0.060		0.099		0.328		0.084	
Within person variance	0.724		0.785		0.371		0.405	
Between family variance	0.168		0.052		0.289		0.312	
Random effect variance person					0.073			
Random effect variance family					0.005			
Intraclass correlation								
Person level	.04		.05		.23		.02	
Family level	.17		.07		.26		.32	

Note. *N* = 148 parents; *n* = 442 observations of observed parenting; *n* = 437 observations of perceived parenting. AS = parental autonomy support; PC = parental psychological control; L/U = parental listening and understanding; C/D = parental criticism and dominance; HC = families with a healthy control adolescent; DEP = families with an adolescent with current MDD/dysthymia; PSI = problem solving interaction task; EPI = event planning interaction task; REM = reminiscence interaction task. Biological sex: 0 = female, 1 = male.

[a] Tested in a separate model. Output for this variable is based on the model including EPI as the reference category in dummy coding. Whereas all other output is based on the model including PSI as the reference category in dummy coding.

Supplementary Table 5

Results Multilevel Analyses on the Relation between Observed AS and PC, and Perceived L/U and C/D (H1.3)

	Observed AS				Observed PC			
	Perceived L/U		Perceived criticism		Perceived L/U		Perceived C/D	
	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*
Fixed effects								
Intercept	0.491 (0.924)	.597	0.420 (0.896)	.640	0.516 (0.931)	.580	0.383 (0.897)	.670
Observed parenting	0.072 (0.039)	.067	-0.120 (0.038)	.002	-0.093 (0.038)	.014	0.107 (0.037)	.004
Type of task								
EPI v. PSI	0.548 (0.074)	<.001	-0.804 (0.074)	<.001	0.517 (0.076)	<.001	-0.779 (0.076)	<.001
REM v. PSI	0.537 (0.077)	<.001	-0.821 (0.076)	<.001	0.529 (0.076)	<.001	-0.831 (0.076)	<.001
REM v. EPI[a]	-0.011 (0.075)	.883	-0.016 (0.075)	.830	0.012 (0.074)	.871	-0.053 (0.074)	.478
Biological sex parent	0.300 (0.100)	.004	-0.177 (0.079)	.029	0.310 (0.100)	.003	-0.192 (0.079)	.017
Biological sex adolescent	0.048 (0.163)	.768	-0.364 (0.159)	.025	0.045 (0.164)	.786	-0.357 (0.159)	.028
Age adolescent	-0.065 (0.059)	.275	0.028 (0.057)	.628	-0.066 (0.059)	.272	0.030 (0.057)	.602
Random effects								
Between person variance	0.219		0.088		0.221		0.082	
Within person variance	0.396		0.392		0.391		0.396	
Between family variance	0.260		0.310		0.267		0.313	
Intraclass correlation								
Person level	.23		.02		.23		.02	
Family level	.26		.32		.26		.32	

Note. *N* = 148 parents; *n* = 442 observations of observed parenting; *n* = 437 observations of perceived parenting. AS = parental autonomy support; PC = parental psychological control; L/U = parental listening and understanding; C/D = parental criticism and dominance; HC = families with a healthy control adolescent; DEP = families with an adolescent with current MDD/dysthymia; PSI = problem solving interaction task; EPI = event planning interaction task; REM = reminiscence interaction task. Biological sex: 0 = female, 1 = male.

[a] Tested in a separate model. Output for this variable is based on the model including EPI as the reference category in dummy coding. Whereas all other output is based on the model including PSI as the reference category in dummy coding.

Supplementary Table 6

Results Multilevel Analyses on the Relation between Observed AS and PC, and Adolescent Positive and Negative Affect (H1.3)

	Observed AS				Observed PC			
	Positive affect		Negative affect		Positive affect		Negative affect	
	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*
Fixed effects								
Intercept	-0.061 (.089)	.498	0.002 (.088)	.985	-0.018 (.084)	.829	0.009 (.089)	.918
Observed parenting	0.054 (.060)	.368	-0.020 (.041)	.629	0.036 (.046)	.440	-0.008 (.040)	.834
Type of task								
EPI v. PSI	0.467 (.076)	<.001	-0.331 (.082)	<.001	0.469 (.078)	<.001	-0.340 (.084)	<.001
REM v. PSI	-0.222 (.086)	.010	-0.330 (.087)	<.001	-0.307 (.086)	<.001	0.315 (.087)	<.001
REM v. EPI[a]	-0.690 (.080)	<.001	0.661 (.085)	<.001	-0.776 (.079)	<.001	0.656 (.084)	<.001
Observed AS/PC*Type of task								
Observed*EPI (v. PSI)	-0.008 (.082)	.926						
Observed*REM (v. PSI)	-0.224 (.082)	.006						
Observed*REM (v. EPI) [a]	-0.216 (.084)	.011						
Pre-task affect	0.101 (.047)	.032	0.095 (.045)	.038	0.169 (.046)	<.001	0.095 (.045)	.037
Random effects								
Between person variance	.084		.039		.032		.039	
Within person variance	.393		.485		.389		.486	
Between family variance	.336		.323		.277		.319	
Random effect variance person					.009			
Random effect variance family					.050			
Intraclass correlation								
Person level	.07		.03		.07		.03	
Family level	.42		.40		.42		.40	

Note. *N* = 148 parents; *n* = 442 observations of observed parenting; *n* = 437 observations of perceived parenting. AS = parental autonomy support; PC = parental psychological control; L/U = parental listening and understanding; C/D = parental criticism and dominance; HC = families with a healthy control adolescent; DEP = families with an adolescent with current MDD/dysthymia; PSI = problem solving interaction task; EPI = event planning interaction task; REM = reminiscence interaction task. Biological sex: 0 = female, 1 = male.

[a] Tested in a separate model. Output for this variable is based on the model including EPI as the reference category in dummy coding. Whereas all other output is based on the model including PSI as the reference category in dummy coding.

Supplementary Table 7

Results Multilevel Analyses on the Relation between Observed AS and PC, and Perceived L/U and C/D in Daily Life (H1.4)

	Observed AS				Observed PC			
	EMA L/U		EMA Criticism		EMA L/U		EMA C/D	
	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*
Fixed effects								
Intercept	-0.001 (.103)	.991	0.014 (.102)	.894	-0.001 (.105)	.995	0.014 (.102)	.894
Observed parenting	0.114 (.076)	.136	-0.051 (.078)	.517	-0.176 (.068)	.011	0.081 (.073)	.266
Random effects								
Within person variance	.359		.409		.322		.581	
Between family variance	.631		.576		.683		.403	
Intraclass correlation								
Family level	.63		.59		.63		.59	

Note. *N* = 148 parents; *n* = 148 observations of observed parenting; *n* = 142 observations of perceived parenting in daily life. AS = parental autonomy support; PC = parental psychological control; L/U = parental listening and understanding; C/D = parental criticism and dominance; HC = families with a healthy control adolescent; DEP = families with an adolescent with current MDD/dysthymia; PSI = problem solving interaction task; EPI = event planning interaction task; REM = reminiscence interaction task. Biological sex: 0 = female, 1 = male.

Supplementary Table 8

Model Fit Statistics Multilevel Analyses Part 2 (H2.1-3)

	Obs.	LL	AIC	BIC	Anova for model fit improvement Comparing	χ^2	df	*p*
Group -> Observed AS								
a. Unconditional model individual (model 1a)	628	-874.78	1755.6	1768.9				
b. Unconditional model individual and family (model 1b)	628	-870.89	1749.8	1767.5	1a and 1b	7.777	1	.005
c. Group (HC v. DEP) model (model 2)	628	-869.69	1749.4	1771.6	1b and 2	2.397	1	.122
d. Group and random slope model (model 3)	628	-867.33	1752.7	1792.6	2 and 3	4.732	4	.316
e. Group and type of task (EPI, REM) model (**model 4**)	628	-852.77	1719.5	1750.6	2 and 4	33.836	2	<.001
f. Group*type of task model (model 5)	628	-852.54	1723.1	1763.1	4 and 5	0.470	2	.791
f. Group, type of task and covariates model (model 6)	628	-850.39	1720.8	1765.2	4 and 6	4.773	3	.189
Goup -> Observed PC								
a. Unconditional model individual (model 1a)	628	-883.28	1772.6	1785.9				
b. Unconditional model individual and family (model 1b)	628	-883.28	1774.6	1792.3	1a and 1b	0.001	1	.975
c. Group (HC v. DEP) model (model 2)	628	-882.95	1775.9	1798.1	1b and 2	0.672	1	.412
d. Group and random slope model (model 3)	628	-880.28	1778.6	1818.5	2 and 3	5.324	4	.256
e. Group and type of task (EPI, REM) model (**model 4**)	628	-865.29	1744.6	1775.7	2 and 4	35.316	2	<.001
f. Group*type of task model (model 5)	628	-864.73	1747.5	1787.5	4 and 5	1.108	2	.575
g. Group, type of task covariates model (model 6)	628	-865.17	1750.3	1794.8	4 and 6	0.230	3	.973
Group -> L/U								
a. Unconditional model individual (model 1a)	622	-779.07	1564.2	1577.5				
b. Unconditional model individual and family (model 1b)	622	-768.74	1545.5	1563.2	1a and 1b	20.673	1	<.001
c. Group (HC v. DEP) model (model 2)	622	-764.58	1539.2	1561.3	1b and 2	8.314	1	.004
d. Group and random slope model (model 3)	622	-756.35	1530.7	1570.6	2 and 3	16.54	4	.002
e. Group and type of task (EPI, REM) model (**model 4**)	622	-715.44	1444.9	1475.9	2 and 4	98.274	2	<.001
f. Group*type of task model (model 5)	622	-714.39	1446.8	1486.7	4 and 5	2.113	2	.348

g. Group, random slope, type of task, and covariates model (model 6)	622	-712.81	1445.6	1490.0	4 and 6	5.262	3	.154
Group -> C/D								
a. Unconditional model individual (model 1a)	622	-832.92	1671.8	1685.1				
b. Unconditional model individual and family (model 1b)	622	-811.66	1631.3	1649.0	1a and 1b	42.519	1	<.001
c. Group (HC v. DEP) model (model 2)	622	-810.48	1631.0	1653.1	1b and 2	2.361	1	.124
d. Group and random slope model (model 3)	622	-807.00	1632.0	1671.9	2 and 3	6.957	4	.138
e. Group and type of task model (model 4)	622	-727.78	1469.6	1500.6	2 and 4	165.390	2	<.001
f. Group*type of task model (model 5)	622	-725.09	1468.2	1508.1	4 and 5	5.398	2	.067
g. Group*type of task and covariates model (**model 6**)	622	-720.49	1465.0	1518.2	5 and 6	9.193	3	.027
Observed AS -> L/U								
a. Unconditional model individual (model 1a)	622	-779.07	1564.2	1577.5				
b. Unconditional model individual and family (model 1b)	622	-768.74	1545.5	1563.2	1a and 1b	20.673	1	<.001
c. AS model (model 2)	622	-757.87	1525.8	1547.9	1b and 2	21.730	1	<.001
d. AS and random slope model (model 3)	622	-755.34	1528.7	1568.6	2 and 3	5.068	4	.280
e. AS and group (HC v. DEP) model (model 4)	622	-754.05	1520.1	1546.7	3 and 4	7.653	1	.006
f. AS*group model (model 5)	622	-753.89	1521.8	1552.8	4 and 5	0.320	1	.572
g. AS*group and type of task (EPI, REM) model (**model 6**)	622	-710.69	1439.4	1479.3	5 and 6	86.385	2	<.001
h. AS*group, type of task (EPI, REM), and covariate model (model 7)	622	-708.39	1440.8	1494.0	6 and 7	4.602	3	.203
Observed AS -> C/D								
a. Unconditional model individual (model 1a)	622	-832.92	1671.8	1685.1				
b. Unconditional model individual and family (model 1b)	622	-811.66	1631.3	1649.0	1a and 1b	42.519	1	<.001
c. AS model (model 2)	622	-798.98	1608.0	1630.1	1b and 2	25.354	1	<.001
d. AS and random slope model (model 3)	622	-798.19	1614.4	1654.3	2 and 3	1.585	4	.811
e. AS and group (HC v. DEP) model (model 4)	622	-798.13	1608.3	1634.9	2 and 4	1.701	1	.192
f. AS*group model (model 5)	622	-796.99	1608.0	1639.0	4 and 5	2.292	1	.130
g. AS*group and type of task (EPI, REM) model (model 6)	622	-721.69	1461.4	1501.3	5 and 6	150.59	2	<.001

Supplementary Table 8 Continued

					Anova for model fit improvement			
	Obs.	LL	AIC	BIC	Comparing	χ^2	df	*p*
Observed AS -> C/D								
h. AS*group, type of task, and covariates model (**model 7**)	622	-717.25	1458.5	1511.7	6 and 7	8.882	3	.031
Observed PC -> L/U								
a. Unconditional model individual (model 1a)	622	-779.07	1564.2	1577.5				
b. Unconditional model individual and family (model 1b)	622	-768.74	1545.5	1563.2	1a and 1b	20.673	1	<.001
c. PC model (model 2)	622	-752.34	1514.7	1536.8	1b and 2	32.803	1	<.001
d. PC and random slope model (model 3)	622	-752.07	1522.1	1562.0	2 and 3	0.531	4	.970
e. PC and group (HC v. DEP) model (model 4)	622	-748.31	1508.6	1535.2	2 and 4	8.047	1	.005
f. PC*group model (model 5)	622	-748.15	1510.3	1541.3	4 and 5	0.326	1	.568
g. PC*group and type of task (EPI, REM) model (**model 6**)	622	-708.49	1435.0	1474.9	5 and 6	79.323	2	<.001
h. PC*group, type of task, and covariates model (model 7)	622	-705.85	1435.7	1488.9	6 and 7	5.268	3	.153
Observed PC -> C/D								
a. Unconditional model individual (model 1a)	622	-832.92	1671.8	1685.1				
b. Unconditional model individual and family (model 1b)	622	-811.66	1631.3	1649.0	1a and 1b	42.519	1	<.001
c. PC model (model 2)	622	-793.08	1596.2	1618.3	1b and 2	37.169	1	<.001
d. PC and random slope model (model 3)	622	-792.31	1602.6	1642.5	2 and 3	1.527	4	.822
e. PC and group (HC v. DEP) model (model 4)	622	-792.08	1596.2	1622.8	2 and 4	1.998	1	.158
Observed PC -> C/D								
f. PC*group model (model 5)	622	-791.93	1597.9	1628.9	4 and 5	0.299	1	.584
g. PC*group and type of task (EPI, REM) model (model 6)	622	-720.65	1459.3	1499.2	5 and 6	142.56	2	<.001
i. PC*group, type of task, and covariates model (**model 7**)	622	-715.92	1455.8	1509.0	6 and 7	9.462	3	.024
f. PC*group model (model 5)	622	-791.93	1597.9	1628.9	4 and 5	0.299	1	.584
g. PC*group and type of task (EPI, REM) model (model 6)	622	-720.65	1459.3	1499.2	5 and 6	142.56	2	<.001
i. PC*group, type of task, and covariates model (**model 7**)	622	-715.92	1455.8	1509.0	6 and 7	9.462	3	.024
Observed AS -> Positive affect								

a. Unconditional model individual (model 1a)	623	-732.38	1470.8	1484.1				
b. Unconditional model individual and family (model 1b)	623	-685.57	1379.1	1396.9	1a and 1b	93.621	1	<.001
c. AS model (model 2)	623	-685.33	1380.7	1402.8	1b and 2	0.470	1	.493
d. AS and random slope model (model 3)	623	-682.96	1383.9	1423.8	2 and 3	4.740	4	.315
e. AS and group (HC v. DEP) model (model 4)	623	-657.67	1327.3	1354.0	2 and 4	55.318	1	<.001
f. AS*group model (model 5)	623	-657.56	1329.1	1360.2	4 and 5	0.215	1	.643
g. AS*group and type of task (EPI, REM) model (model 6)	623	-595.93	1209.9	1249.8	5 and 6	123.260	2	<.001
h. AS*group, type of task, and pre-task affect model (**model 7**)[a]	620	-590.91	1201.8	1246.1	6 and 7	5.63	1	.018
i. AS*condition, type of task, pre-task affect, and covariates model (model 8)	620	-589.30	1204.6	1262.2	7 and 8	3.226	3	.358
Observed AS -> Negative affect								
a. Unconditional model individual (model 1a)	623	-703.03	1412.1	1425.4				
b. Unconditional model individual and family (model 1b)	623	-648.66	1305.3	1323.1	1a and 1b	108.74	1	<.001
c. PC model (model 2)	623	-648.61	1307.2	1329.4	1b and 2	0.108	1	.743
d. PC and random slope model (model 3)	623	-645.99	1310.0	1349.9	2 and 3	5.251	4	.263
e. PC and group (HC v. DEP) model (model 4)	623	-620.55	1253.1	1279.7	2 and 4	56.12	1	<.001
f. PC*group model (model 5)	623	-620.47	1254.9	1286.0	4 and 5	0.165	1	.685
g. PC*group and type of task (EPI, REM) model (model 6)	623	-584.54	1187.1	1227.0	5 and 6	71.859	2	<.001
h. PC*group, type of task, and pre-task affect model (**model 7**)[a]	620	-576.65	1173.3	1217.6	6 and 7	9.987	1	.002
f. PC*group, type of task, pre-task affect, and covariates model (model 7)	620	-576.41	1178.8	1236.4	7 and 8	0.480	3	.923
Observed PC -> Positive affect								
a. Unconditional model individual (model 1a)	623	-732.38	1470.8	1484.1				
b. Unconditional model individual and family (model 1b)	623	-685.57	1379.1	1396.9	1a and 1b	93.621	1	<.001
c. PC model (model 2)	623	-684.47	1378.9	1401.1	1b and 2	2.200	1	.138
d. PC and random slope model (model 3)	623	-680.47	1378.9	1418.8	2 and 3	7.998	4	.092
e. PC and group (HC v. DEP) model (model 4)	623	-656.97	1325.9	1352.5	2 and 4	54.989	1	<.001

Supplementary Table 8 Continued

					Anova for model fit improvement			
	Obs.	LL	AIC	BIC	Comparing	χ^2	df	*p*
Observed PC -> Positive affect								
f. PC*group model (model 5)	623	-656.30	1326.6	1357.6	4 and 5	1.338	1	.247
Observed PC -> Positive affect								
g. PC*group and type of task (EPI, REM) model (model 6)	623	-595.30	1208.6	1248.5	5 and 6	122.000	2	<.001
h. PC*group, type of task, and pre-task affect model (**model 7**)[a]	620	-592.78	1205.6	1249.9	6 and 7	0.784	1	.376
h. PC*group, type of task, pre-task affect, and covariates model (model 8)	620	-591.42	1208.8	1266.4	7 and 8	2.728	3	.436
Observed PC -> Negative affect	623							
a. Unconditional model individual (model 1a)	623	-703.03	1412.1	1425.4				
b. Unconditional model individual and family (model 1b)	623	-648.66	1305.3	1323.1	1a and 1b	108.74	1	<.001
c. PC model (model 2)	623	-647.35	1304.7	1326.9	1b and 2	2.622	1	.105
d. PC and random slope model (model 3)	623	-645.54	1309.1	1349.0	2 and 3	3.630	4	.458
e. PC and group (HC v. DEP) model (model 4)	623	-619.44	1250.9	1277.5	2 and 4	55.828	1	<.001
f. PC*group model (model 5)	623	-617.68	1249.4	1280.4	4 and 5	3.515	1	.061
g. PC*group and type of task model (EPI, REM) (model 6)	623	-582.47	1182.9	1222.8	5 and 6	70.433	2	<.001
h. PC*group, type of task, and pre-task affect model (**model 7**)[a]	620	-573.68	1167.4	1211.7	6 and 7	11.717	1	.001
h. PC*group, type of task, pre-task affect, and covariates model (model 8)	620	-573.44	1172.9	1230.5	7 and 8	0.473	3	.925

Note. AS = parental autonomy support; PC = parental psychological control; L/U = parental listening and understanding; C/D = parental criticism and dominance; HC = families with a healthy control adolescent; DEP = families with an adolescent with current MDD/dysthymia; PSI = problem solving interaction task; EPI = event planning interaction task; REM = reminiscence interaction task. Covariates: parental sex, adolescent sex and age. Sex: 0 = female, 1 = male; Group: 0 = HC, 1 = DEP. Type of task model: dummy coding with PSI as reference category.

[a] Model fit comparison could not run on model 6 and 7 with adolescent affect as the dependent variable, because of missing data for pre-task affect (*n* = 3 observations). In order to compute model fit statistics in comparing model 6 and 7 with adolescent affect as the dependent variable, cases with missing data for pre-task affect were excluded in the comparison of these models.

Supplementary Table 9

Results Multilevel Analyses on the Effect of Group on Observed AS and PC (H2.1) and Perceived L/U and C/D (H2.2)

	Observed AS		Observed PC		Perceived L/U		Perceived C/D	
	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*
Fixed effects								
Intercept	-0.175 (.080)	.029	0.275 (.074)	<.001	-0.200 (.085)	.021	1.387 (.749)	.066
Group (HC v. DEP)	-0.184 (.117)	.120	0.083 (.100)	.410	-0.431 (.145)	.004	0.136 (.163)	.406
Type of task								
EPI v. PSI	0.221 (.082)	.007	-0.467 (.086)	<.001	0.529 (.056)	<.001	-0.782 (.072)	<.001
REM v. PSI	0.487 (.082)	<.001	-0.433 (.086)	<.001	0.486 (.056)	<.001	-0.829 (.073)	<.001
REM v. EPI[a]	0.226 (.082)	.001	0.034 (.086)	.691	-0.043 (.056)	.446	-0.047 (.073)	.517
Group*Type of task								
Group*EPI (v. PSI)							0.057 (.133)	.669
Group*REM (v. PSI)							0.293 (.133)	.028
Group*EPI (v. REM) [a]							0.236 (.133)	.076
Biological sex parent							-0.160 (.070)	.023
Biological sex adolescent							-0.232 (.142)	.106
Age adolescent							-0.043 (.047)	.363
Random effects								
Between person variance	.114		.178		.302		.110	
Within person variance	.704		.772		.323		.380	
Between family variance	.136		.002		.274		.347	
Intraclass correlation								
Person level	.10		.16		.28		.06	
Family level	.14		.00		.31		.36	

Note. *N* = 148 parents; *n* = 442 observations of observed parenting; *n* = 437 observations of perceived parenting. AS = parental autonomy support; PC = parental psychological control; L/U = parental listening and understanding; C/D = parental criticism and dominance; HC = families with a healthy control adolescent; DEP = families with an adolescent with current MDD/dysthymia; PSI = problem solving interaction task; EPI = event planning interaction task; REM = reminiscence interaction task. Sex: 0 = female, 1 = male. Group: 0 = HC, 1 = DEP.

[a] Task difference REM v. EPI are tested in a separate model. Output for this variable is based on the model including EPI as the reference category in dummy coding. Whereas all other output is based on the model including PSI as the reference category in dummy coding.

Supplementary Table 10

Results Multilevel Analyses on the Relation between Observed AS and PC, and Perceived L/U and C/D (H2.3)

	Observed AS				Observed PC			
	Perceived L/U		Perceived criticism		Perceived L/U		Perceived C/D	
	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*
Fixed effects								
Intercept	-0.185 (.084)	.030	1.414 (.749)	.061	-0.174 (.084)	.041	1.362 (.745)	.070
Observed parenting	0.069 (.037)	.066	-0.131 (.039)	.001	-0.082 (.036)	.023	0.113 (.038)	.003
Group (HC v. DEP)	-0.412 (.143)	.005	0.237 (.144)	.104	-0.420 (.142)	.004	0.241 (.144)	.095
Observed parenting*Group	0.062 (.063)	.322	0.079 (.065)	.223	-0.067 (.060)	.264	0.011 (.062)	.865
Type of task								
EPI v. PSI	0.512 (.056)	<.001	-0.741 (.060)	<.001	0.486 (.057)	<.001	-0.714 (.062)	<.001
REM v. PSI	0.446 (.058)	<.001	-0.689 (.062)	<.001	0.446 (.057)	<.001	-0.693 (.062)	<.001
REM v. EPI[a]	-0.066 (.056)	.243	0.053 (.061)	.390	-0.040 (.056)	.473	0.021 (.060)	.729
Biological sex parent			-0.148 (.069)	.035			-0.158 (.069)	.023
Biological sex adolescent			-0.237 (.142)	.099			-0.234 (.142)	.099
Age adolescent			-0.048 (.047)	.309			-0.046 (.047)	.335
Random effects								
Between person variance	.291		.110		.286		.104	
Within person variance	.320		.375		.318		.376	
Between family variance	.264		.348		.266		.347	
Intraclass correlation								
Person level	.28		.06		.28		.06	
Family level	.31		.36		.31		.36	

Note. *N* = 148 parents; *n* = 442 observations of observed parenting; *n* = 437 observations of perceived parenting. AS = parental autonomy support; PC = parental psychological control; L/U = parental listening and understanding; C/D = parental criticism and dominance; HC = families with a healthy control adolescent; DEP = families with an adolescent with current MDD/dysthymia; PSI = problem solving interaction task; EPI = event planning interaction task; REM = reminiscence interaction task. Sex: 0 = female, 1 = male. Group: 0 = HC, 1 = DEP.

[a] Task difference REM v. EPI are tested in a separate model. Output for this variable is based on the model including EPI as the reference category in dummy coding. Whereas all other output is based on the model including PSI as the reference category in dummy coding.

Supplementary Table 11

Results Multilevel Analyses on the Relation between Observed AS and PC, and Adolescent Positive and Negative Affect (H2.3)

	Observed AS				Observed PC			
	Positive affect		Negative affect		Positive affect		Negative affect	
	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*	Estimate (*SE*)	*p*
Fixed effects								
Intercept	0.203 (.068)	.004	-0.226 (.064)	.001	0.215 (.078)	.007	-0.221 (.063)	.001
Observed parenting	-0.021 (.032)	.526	-0.012 (.032)	.719	0.017 (.030)	.567	-0.015 (.031)	.631
Group (HC v. DEP)	-0.930 (.121)	<.001	0.833 (.110)	<.001	-1.087 (.139)	<.001	0.810 (.107)	<.001
Observed parenting*Group	0.029 (.054)	.589	-0.037 (.052)	.486	-0.067 (.050)	.177	0.122 (.050)	.015
Type of task								
EPI v. PSI	0.426 (.068)	<.001	-0.297 (.052)	<.001	0.449 (.049)	<.001	-0.296 (.054)	<.001
REM v. PSI	-0.182 (.057)	.002	0.190 (.055)	.001	-0.092 (.050)	.069	0.191 (.055)	.001
REM v. EPI[a]	-0.607 (.055)	<.001	0.487 (.054)	<.001	-0.541 (.050)	<.001	0.486 (.054)	<.001
Pre-task affect	0.178 (.040)	<.001	0.270 (.037)	<.001	-0.039 (.040)	.324	0.290 (.037)	<.001
Random effects								
Between person variance	.044		.009		.077		<.001	
Within person variance	.266		.280		.237		.285	
Between family variance	.229		.187		.329		.177	
Intraclass correlation								
Person level	.06		.06		.06		.06	
Family level	.63		.66		.63		.66	

Note. *N* = 148 parents; *n* = 442 observations of observed parenting; *n* = 437 observations of adolescent affect. AS = parental autonomy support; PC = parental psychological control; L/U = parental listening and understanding; C/D = parental criticism and dominance; HC = families with a healthy control adolescent; DEP = families with an adolescent with current MDD/dysthymia; PSI = problem solving interaction task; EPI = event planning interaction task; REM = reminiscence interaction task. Sex: 0 = female, 1 = male. Group: 0 = HC, 1 = DEP.

[a] Task difference REM v. EPI are tested in a separate model. Output for this variable is based on the model including EPI as the reference category in dummy coding. Whereas all other output is based on the model including PSI as the reference category in dummy coding.