Mother–adolescent conflict interaction sequences

The role of maternal internalizing problems

Van Bommel, D.M.H.; Van der Giessen, D.; Van der Graaff, J.; Meeus, W.H.J.; Branje, S.J.T.

DOI
10.1111/jora.12441

Publication date
2019

Document Version
Final published version

Published in
Journal of Research on Adolescence

JOURNAL OF
Research on Adolescence

Society for Research on Adolescence
www.s-r-a.org

JOURNAL OF RESEARCH ON ADOLESCENCE, 29(4), 1001–1018

Mother–Adolescent Conflict Interaction Sequences: The Role of Maternal Internalizing Problems

Debbie M. H. Van Bommel
Utrecht University

Daniëlle Van der Giessen
University of Amsterdam

Jolien Van der Graaff
Utrecht University

Wim H. J. Meeus
Utrecht University and Tilburg University

Susan J. T. Branje
Utrecht University

Adaptive mother–adolescent conflict interactions are characterized by the ability to move from negative to positive emotions. The current micro-observational study investigated how mothers and adolescents make transitions between positive, neutral and negative emotions and whether these transitions depend on maternal internalizing problems. We used three annual waves of conflict interaction observations among 102 mother–adolescent dyads. Mothers were more likely than adolescents to initiate positivity after negativity whereas adolescents were more likely than mothers to reciprocate negativity. Mothers high and low in internalizing problems were equally likely to drive transitions toward positivity. Our study indicates that an active role of mothers in regulating negativity toward positivity is desirable because adolescents are likely to maintain dysfunctional interaction patterns of rigid negativity.

Adolescence is a period in which the intensity of parent–adolescent conflicts rises (De Goede, Branje, & Meeus, 2009). It is well known that severe conflicts have detrimental effects on adolescent development, relationships, and future adjustment (Laursen & Collins, 1994). However, only a small proportion of adolescents experience extremely conflicted relationships with parents (Smetana, 2011), and conflicts are mainly considered to be normative in adolescence (Collins & Laursen, 2004). According to expectancy violation realignment theory (Collins, 1995), the long-term interdependent parent–child relationship is a foundation for expectations toward each other that guide interpersonal behaviors and perceptions. During the transition to adolescence, parent–adolescent relationships become increasingly egalitarian, with adolescents beginning to strive for more autonomy (Hadiwijaya, Klimstra, Vermunt, Branje, & Meeus, 2017; Smetana, 2011). Discrepancies in parents' and adolescents' expectations may occur as a result, for example because parents find their adolescent's demand for more autonomy not yet appropriate. These discrepancies in expectations generate more conflictual interactions, which in turn allow negotiation around the realignment of the relationship and more age-appropriate expectations. Similarly, the dynamic systems approach considers early adolescence as an important phase-transition in which the parent–child system is reorganized during interactions such as conflicts (Granic & Patterson, 2006). Hence, expectancy violation realignment theory and the dynamic systems approach suggest that parent–adolescent conflicts can be seen as a means to negotiate relational changes. Little is known about the interaction processes during these conflicts. However, it is important to understand how conflict interactions unfold in real time to aid the identification of adaptive and maladaptive conflict interactions.

Within the dynamic systems approach, emotional variability is considered to be an important distinc-

Data of the RADAR study were used. RADAR has been financially supported by main grants from the Netherlands Organisation for Scientific Research (GB-MAGW 480-03-005, GB-MAGW 480-08-006), the Netherlands Organisation for Scientific Research to the Consortium Individual Development (CID; 024.001.003), and Stichting Achmea Slachtoffer en Samenleving (SASS), and various other grants from the Netherlands Organisation for Scientific Research, the Free University of Amsterdam, and Utrecht University.

Requests for reprints should be sent to Susan J. T. Branje, Research Centre Adolescent Development, Utrecht University, Postbus 80140, 3508 TC Utrecht, The Netherlands. E-mail: s.branje@uu.nl

DOI: 10.1111/jora.12441

tive characteristic of adaptive conflict interactions in adolescence. This can be defined as the ability to flexibly switch among a broad range of expressed emotional states during interactions (Van der Giessen et al., 2015). More emotional variability is related to adolescents showing less aggressive behavior, higher perceived relationship quality (Van der Giessen, Branje, Frijns, & Meeus, 2013), and less internalizing problems over time (Van der Giessen et al., 2015). This flexibility is more important than the emotional valence of conflict interactions (Lunkenheimer, Hollenstein, Wang, & Shields, 2012), suggesting that mothers and adolescents who express solely positive emotions during conflicts do not act in consonance with the situational demands of a conflict (Lougheed & Hollenstein, 2016). Emotions are important behavior regulators in social interactions and can aid the achievement of personal goals (Walle & Campos, 2012), thus the expression of negative emotions in a conflictual context can be appropriate, indicating the importance of the issue for the individual and ultimately contributing to resolution of the conflict. Furthermore, rigid and persistent interaction cycles of mutual hostility are associated with adjustment problems and psychopathology in children (Patterson, 1982). Since negative emotions are found to be more contagious than positive emotions and parents and adolescents both tend to reciprocate negativity, it can be difficult to break negative interaction cycles (Conger & Ge, 1999; Kim, Conger, Lorenz, & Elder, 2001; Larson & Almeida, 1999). The ability to make transitions toward positive emotions after negative interaction cycles is considered to be especially adaptive, since it prevents interactions from becoming rigidly negative (Hollenstein, Lichtwarck-Aschoff, & Potworowski, 2013). Therefore, the main aim of this observational study is to identify adaptive conflict interaction sequences between mothers and adolescents by examining how transitions to negative and positive emotions are made in real-time conflict interactions.

Transmission of Emotions Between Mothers and Adolescents

To get more insight into how mothers and adolescents transition to various emotions, it is important to understand how both interaction partners influence each other within the dyad. Emotions that mothers and adolescents experience can be a function of their own emotions, but might also be influenced by their interaction partner (Butler, 2011). Although transmission of emotions happens in both directions, emotions are more likely transmitted from parents to children (Almeida, Wethington, & Chandler, 1999; Larson & Gillman, 1999). Also, children were found to have higher levels of emotion regulation skills if parents succeeded in letting their children experience both positive and negative emotions, as long as the negative emotions were not too dominant (Lunkenheimer, Shields, & Cortina, 2007; Raver & Spagnola, 2003). According to a social learning perspective, which states that new behavior can be acquired through direct experience or by observing the behavior of others (Bandura, 1977), mothers' own expressiveness of emotions serves as a model for adolescents' expression and regulation of emotions (Morris, Silk, Steinberg, Myers, & Robinson, 2007; Thompson & Meyer, 2007). Mothers have better developed emotion regulation skills (Morris et al., 2007) and more mature conflict management strategies (Collins, 1997) than adolescents. Therefore, we expect mothers to have a leading role in regulating emotions and driving transitions during conflict interactions.

Before we can understand maladaptive conflict interaction processes, it is necessary to first identify the adaptive processes in normative adolescent populations. Previous real-time observational research into conflict interactions during adolescence is fairly limited because it mainly focuses on clinical instead of normative populations. However, the limited studies available also suggest that mothers play a leading role in initiating positivity and impeding negativity. In both normal (Fletcher, Fischer, Barkley, & Smallish, 1996) and clinical adolescent samples (Granic & Lamey, 2002; Sheeber, Allen, Davis, & Sorensen, 2000; Slesnick & Waldron, 1997), mothers are likely to initiate positive behavior regardless of the valence of the behavior of the adolescent. Positive interaction cycles with younger children were also often preceded by positive emotions of the mother (Dumas, Lemay, & Dauwalder, 2001). Adolescents are likely to reciprocate the preceding behavior of the mother (Fletcher et al., 1996). In fact, when mothers allow escalation of hostility and wait for the adolescent to end the conflict, longer chains of reciprocal negativity were observed (Moed et al., 2015). Overall, mothers' tendency to initiate positivity seems to be strong, while adolescents seem more likely to maintain negative interaction patterns. Consequently, guided by a social learning perspective, we expect that mothers will be more likely than adolescents to initiate positivity after negativity during conflict interactions, because they are better able to model adaptive transitions in emotions due to more

mature conflict management styles. Moreover, we expect adolescents to be more likely than mothers to reciprocate both positive and negative emotions, as social learning perspective suggests that adolescents learn emotion regulation strategies from their mother. In line with expectancy violation realignment theory, we expect that adolescents will be more drawn to expressing negativity in order to negotiate more mature privileges, which results in more negative reciprocity and less initiation of positivity by adolescents compared to mothers.

The Role of Maternal Internalizing Problems in Conflict Interactions With Adolescents

Whereas some mother–adolescent dyads succeed in having adaptive conflict interactions, others do not. According to the dynamic systems approach, adaptive conflict interactions are characterized by emotional variability. Internalizing problems of mothers, such as anxiety or depression, might have an influence on the interaction patterns of mother–adolescent dyads, but are underexamined compared to internalizing problems in adolescents. In line with the dynamic systems view on adaptive conflict interactions, previous research on interaction behaviors found that internalizing problems of the mother, including symptoms of anxiety and depression, were associated with less emotional variability (Lougheed & Hollenstein, 2016; Van der Giessen et al., 2015). Generally, internalizing problems are associated with difficulties in selecting appropriate emotional responses and more frequent or disproportionate negative emotions (Dix & Meunier, 2009; Mennin, Holaway, Fresco, Moore, & Heimberg, 2007). Both proneness toward negative affect and difficulties in regulating emotions of mothers with internalizing problems are thought to restrict the initiation of positive interactions. Moreover, from a social learning perspective it could be argued that adolescents learn ineffective emotion regulation strategies from mothers with internalizing problems (Bandura, 1977; Morris et al., 2007), which could further contribute to dyads having difficulties in showing adaptive interaction patterns. First, we expect that dyads with mothers high in internalizing problems will show less emotionally variable interactions and thus make fewer transitions in emotional states than dyads with mothers low in internalizing problems. Second, we expect that mothers high in internalizing problems will have more difficulties in initiating positivity after negativity and will be more likely to reciprocate negativity than mothers low in emotion regulation problems.

Research Aims and Hypotheses

The main aim of this study is to examine the role of the mother in making transitions in emotions during conflict interactions with adolescents. The first research question is as follows: "How do mother–adolescent dyads make transitions from negative to positive emotional states, and vice versa?" Research has shown that emotionally variable conflict interactions in which parents and adolescents are able to flexibly express different emotions are adaptive and allow successful development into more egalitarian relationships (e.g., Lougheed & Hollenstein, 2016; Van der Giessen et al., 2013, 2015). However, it is yet unclear how emotions of mothers and adolescents follow each other during conflict interactions. We will focus on transitions from and toward neutral emotions in addition to transitions between negative and positive emotions, since neutral affect appears to be the most common state from which dyads tend to move to either positive or negative emotional states (Dishion, Andrews, & Crosby, 1995; Lunkenheimer, Olson, Hollenstein, Sameroff, & Winter, 2011). By investigating within-person transitions in addition to between-person transitions, our study more accurately examines real-time interaction processes and extends previous research (e.g., Fletcher et al., 1996). The second research question is as follows: "Are mothers more inclined to initiate positivity after negativity than adolescents?" We expect that mothers are more important than adolescents in driving transitions toward positivity. Since emotions are more likely transmitted from mothers to adolescents than from adolescents to mothers, we expect adolescents to more strongly reciprocate the emotions of the mother than vice versa. Strongest effects are expected for negativity, since negativity is found to be more contagious than positivity. The third and last research question is as follows: "How do transitions differ between dyads with mothers high and low in internalizing problems?" First of all, we expect that dyads with mothers high in internalizing problems make fewer transitions during conflict interactions than mothers low in internalizing problems. Second, we expect that mothers high in internalizing problems are less likely to initiate positivity after negativity and more likely to reciprocate negativity than mothers low in internalizing problems. By examining the moderating role of maternal emotion regulation problems, we aim to identify adaptive and nonadaptive transitions in emotional states during conflict interactions. Although theory and empirical evidence

suggest that mothers serve as important models in the expression of emotions, previous micro-observational research has mainly focused on the moderating role of adolescents' psychopathology (Fletcher et al., 1996; Granic & Lamey, 2002; Moed et al., 2015; Sheeber et al., 2000; Slesnick & Waldron, 1997). Therefore, the present study contributes to the literature by focusing on the role of mothers in conflict interactions with adolescents.

To answer the research questions, we used a micro-observational method, which assessed observed behaviors in discrete, overt units (Weiss & Heyman, 1990). A micro-observational method allows the examination of explicit behaviors and processes in an empirically well-grounded manner, whereas macro-observational methods are mainly useful for inferring the global climate of a complete interaction (Krebs, 2000). Because the dynamic systems approach has repeatedly shown that behavioral processes at the micro-level are associated with developmental outcomes at the macro level (e.g., Van der Giessen et al., 2015), the examination of observed behavior at a micro-level will provide insight into the behavior of parents and adolescents during conflict interactions and how this permits them to resolve conflicts. We will conduct first-order lag sequential analyses to identify contingent relationships between successive emotional states, given that earlier research indicates that most contingent relationships can be found within single-chained interaction sequences (Fletcher et al., 1996). We will focus on three annual waves in which adolescents are 13 to 15 years old. According to the dynamic systems approach, emotional variability peaks during early adolescence (age 13–14; Granic, Hollenstein, Dishion, & Patterson, 2003; Van der Giessen et al., 2013), so transitions can best be captured during this period of adolescence.

METHODS

Participants

The current observational study is part of the RADAR-Y (Research on Adolescent Development and Relationships-Young) project in the Netherlands. The longitudinal RADAR-Y project focuses on the development of relationships and psychoso cial adjustment in adolescence. Of the 497 RADAR-Y participants, a randomly selected subsample participated in an additional observational study with videotaped interaction tasks. Ninety-two mother–adolescent dyads started participation in the first wave. In the second wave, 10 additional pairs of mothers and adolescents were randomly selected for participation in the observational study. The present study used data from the first three annual waves of these 102 mother–adolescent dyads. At the first wave of data collection, adolescents were on average 12.99 years old ($SD = 0.51$) and they were all in the first grade of secondary school. The sample consisted of 61 boys (59.8%) and 41 girls (40.2%). Based on parents' job level, the majority of the families could be classified as having a medium to high socioeconomic status (SES) (92.2%). Furthermore, most adolescents identified with the Dutch ethnicity (96.1%). Mothers had a mean age of 44.54 ($SD = 4.70$). The majority of the mothers were born in the Netherlands (93.1%). Most of the mothers had completed higher education (41.2%), 29.4% higher secondary education or intermediate vocational training and 26.5% lower education.

Attrition analyses. From a total of 102 participants, 18 participants (17.60%) dropped out at the second or third wave. The 10 dyads that started participation in the second wave completed all subsequent waves and are therefore not considered to be attrition. Chi-square tests and t tests were used to examine differences between participants who completed the study and participants who dropped out on all variables in the current study at Wave 1. There were no differences in gender ($\chi^2(1) = 0.43$, $p = .513$), SES ($\chi^2(1) = 1.40$, $p = .237$), age (adolescent: $t(99) = -0.12$, $p = .907$, mother: $t(99) = -0.16$, $p = .875$), depression of the mother ($t(99) = 0.01$, $p = .993$), neuroticism of the mother ($t(99) = -0.04$, $p = .969$), total number of transitions ($t(90) = 0.84$, $p = .404$), expressed negative emotions (adolescent: $t(90) = -0.31$, $p = .756$, mother: $t(90) = 0.19$, $p = .852$), expressed neutral emotions (adolescent: $t(90) < -0.01$, $p = .998$, mother: $t(90) = 1.30$, $p = .196$) and expressed positive emotions of the adolescent ($t(90) = .26$, $p = .793$) at Wave 1 between drop outs and completers. However, mothers from the attrition group expressed significantly fewer positive emotions than mothers who completed all waves ($M_{\text{completers}} = 7.24$, $SD = 4.29$, $M_{\text{attrition}} = 4.78$, $SD = 3.28$, $t(90) = 2.28$, $p = .025$). Little's MCAR-Test suggested that data were missing completely at random ($\chi^2(209) = 223.22$, $p = .238$).

Procedure

Participants for the RADAR-Y study were recruited via randomly selected schools in the central and western parts of the Netherlands. The RADAR study aimed to oversample adolescents at risk for

developing delinquent behavior, so adolescents within these schools were selected based on teacher assessments of externalizing behavior. Other inclusion criteria were participation of both parents, participation of a sibling older than 10 years old, and a good understanding of the Dutch language because of the intensive data collection. Adolescents and their families received written information about the research project and provided informed consent for participation. This resulted in 497 participating families, of which 100 families (half control, half at-risk adolescents) were randomly selected for this observational study. The study was approved by the Medical Ethics Committee of the University Medical Centre Utrecht. A mother–adolescent conflict interaction task was conducted and videotaped during annual home visits. In addition, adolescents and parents filled out several questionnaires. Trained research assistants provided verbal instructions in addition to the written instructions. For each home visit in which families participated, mother–adolescent dyads received compensation of €40.

Conflict interaction task. Mothers and adolescents were instructed to discuss, and attempt to resolve, an issue that recurred most often during the last month for 10 minutes. The Interpersonal Conflict Questionnaire (Laursen, 1995) provided a list of topics with examples of frequent family conflicts (e.g., school problems, chores etc.), which was used as an aid for participants to select an issue. The interactions were videotaped. After eight minutes, the researcher reminded mothers and adolescents that eight minutes had passed and that they should try to resolve the conflict. Several mothers and adolescents ended the conflict interaction after they felt like a resolution was reached. On average, mothers and adolescents resolved the issue in 7.82 min (SD = 1.92).

Measures

Expressed emotions. To assess emotional states of both mother and adolescent, every conflict interaction task was coded using a simplified 10-code version of the SPecific AFFect coding system (SPAFF: Gottman, McCoy, Coan, & Collier, 1996). Using the SPAFF, mutually exclusive emotional states were identified separately for the mother and adolescent, based on a combination of verbal content, voice tone, facial expressions and physical cues. Among the possible emotional states that could be coded were four positive emotional states (joy, affection, humor, and interest), five negative emotional states (contempt, anger, whine, sadness, and fear) and one neutral emotional state (refers to statements and information exchange that are nonemotional in content and voice tone). If participants were completely invisible and inaudible or interacted with someone not taking part in the conflict task (e.g., research assistant), emotional states were coded "uncodable." In all waves, 0.2–0.9% of the emotional states were "uncodable." These codes were excluded from further analyses.

The emotional states were continuously recorded in real time for every mother and adolescent independently, using Observer XT 9.0 (Noldus Information Technology, Wageningen, The Netherlands). In order to achieve a minimum interobserver criterion of 75% agreement and .65 kappa, coders were trained intensively over a period of 3 months. Weekly discussion meetings were held to maintain these criteria. Twenty percent of the videotaped interactions were independently coded by two coders to provide estimates of reliability. Coders were unaware which sessions were used to assess observer agreement. The interobserver agreements were respectively .73 kappa (Wave 1), .70 kappa (Wave 2), and .69 kappa (Wave 3). For the statistical analyses, we collapsed the 10 original codes into three categories: positive, negative, and neutral, in line with previous studies (e.g., Lougheed, Hollenstein, & Lewis, 2016).

First-order transitions in emotional states. First-order transitions, emotional states that immediately follow each other, were examined using contingency tables. Since we coded emotions for mothers and adolescents separately, there were always two concurrent emotional states: the emotional state of the mother and the emotional state of the adolescent. Both mothers' and adolescents' could be the given emotional state (lag 0). The target emotional state was the first change in emotion by either the mother or the adolescent following the given emotional state (lag 1). During conversations, a perfect alternation of responses between mothers and adolescents is highly unlikely. So, while we are most interested in how mothers and adolescents respond to given emotional states of the other, transitions do not always encompass responses of both dyadic partners. In other words, transitions could happen "within" mothers or adolescents (e.g., $\text{Mother}_{\text{positive}} \rightarrow \text{Mother}_{\text{negative}}$, $\text{Adolescent}_{\text{neutral}} \rightarrow \text{Adolescent}_{\text{positive}}$) or "between" mothers and adolescents (e.g., $\text{Mother}_{\text{positive}} \rightarrow \text{Adolescent}_{\text{negative}}$, $\text{Adolescent}_{\text{neutral}} \rightarrow \text{Mother}_{\text{positive}}$). Transitions

within persons are also called *auto-transitions*. Thus, every cell of the contingency table represents a transition between a given emotional state of the mother or adolescent, and the immediate subsequent change of emotional state by either mother or adolescent.

Maternal internalizing problems. Internalizing problems of the mother were assessed using the Anxiety/Depression Scale of the Dutch version of the Adult Self Report (ASR; Achenbach & Rescorla, 2003). The Anxiety/Depression Scale contained 18 items with statements about how the mother had been feeling during the previous six months. There were three response categories: 2 (*evident/often*), 1 (*a little bit/sometimes*), and 0 (*never/does not apply*). Example statements include "I cry a lot," "I am worried about my future," and "I feel lonely." A sum score was used as the composite scale score, in which higher scores indicated higher levels of internalizing problems. The Cronbach's alphas ranged from .89 to .90 across waves, indicating good reliability.

We performed latent class growth analyses (LCGA) in Mplus 7 (Muthén & Muthén, 1998–2012) to determine whether it was possible to identify two groups based on the development of maternal emotion regulation problems across three waves. Missing values were missing completely at random, so full information maximum likelihood (FIML) was considered to be the appropriate method for dealing with missing values. We interpreted the Bayesian information criterion (BIC) values and used both the Vuong-Lo-Mendell-Rubin-likelihood ratio test (VLMR-LRT) and the parametric bootstrapped likelihood ratio test (BLRT) to determine whether participants were well represented using two classes (Van de Schoot, Sijbrandij, Winter, Depaoli, & Vermunt, 2016).

The BIC for the two-class solution (1620.87) was lower than for the one-class solution (1653.21) and both VLMRT-LRT and BLRT were significant, consistently indicating that two classes were preferred over one class (VLMR-LRT: $p = .005$, BLRT: $p < .001$). A three-class solution was significantly better than two classes (BIC = 1595.72, VLMR-LRT: $p = .010$, BLRT: $p < .001$), whereas four classes did not further improve the model (BIC = 1599.84, VLMR-LRT: $p = .446$, BLRT: $p = .167$). Although the three classes were superior over other numbers of classes, the third class contained only two subjects (2%), which was insufficient for further analyses. Therefore, we decided to use the two-class solution, which had high classification accuracy as indicated by an entropy value of .952 (Celeux & Soromenho, 1996). The majority of the mothers could be classified as having low stable internalizing problems ($N = 83$), $\beta_{intercept} = 1.37$, $p < .001$, $\beta_{slope} = 0.17$, $p = .092$. A group of 19 mothers could best be classified as having high decreasing internalizing problems, $\beta_{intercept} = 6.43$, $p < .001$, $\beta_{slope} = -1.07$, $p = .007$.

Analytic Strategy

We converted the moment-to-moment observational data using the Observer to SDIS conversion program (OTS-program) to make the data format suitable for analysis with software for the analysis of interaction sequences, GSEQ5.1 (Bakeman & Quera, 2000, 2011). If the expected frequency of transitions was at least five and the total number of occurrences of emotions was larger than 30, statistical parameters were considered to be trustworthy (Yoder & Symons, 2010). Transitions in emotions at the dyadic level were too infrequent for reliable analyses, so measures were taken to obtain reliable statistical parameters able to describe the phenomena at the group level (Bakeman & Quera, 2011; Klonek, Quera, Burba, & Kauffeld, 2016). First of all, power was insufficient to analyze sequences of time units, so we converted the timed-event data into event data using GSEQ5.1 in order to analyze sequences without taking into account the duration of events. Second, contingency tables were computed by tallying all dyadic transitions across three waves. This resulted in a 6×6 contingency table containing summary statistics across waves and dyads, in which it was not possible to account for different waves. Sensitivity analyses per wave determined that combining waves was justified (see Appendices A and B). Third, collapsing emotional states into the broader categories positive, negative, and neutral was necessary to increase the occurrence of events and obtain more reliable statistic parameters for each transition. We did not use a missing value estimation procedure for missing observation sessions and solely analyzed the available observational sessions.

Contingency tables are useful in displaying frequency distributions of categorical predictor and outcome variables, to reveal dependency between the variables of interest. We used all emotions of the mother and adolescent as both predictor and outcome variable in the contingency tables. A significant χ^2 value for a contingency table indicated a global association between emotional states of the mother and adolescent, which allowed further

interpretation of the association between specific emotional states. Adjusted residuals for each transition indicated whether observed frequencies of transitions significantly deviated from the expected frequencies based on row and column totals (Haberman, 1979). Adjusted residuals are equivalent to *z*-scores and highly dependent on sample size (table totals; Allison & Liker, 1982; Bakeman, Adamson, & Strisik, 1989). As a consequence, larger samples yield more significant results than smaller samples and adjusted residuals cannot be compared across tables with unequal sample sizes. Therefore, we based our interpretation of the results on Yule's *Q* effect sizes that are independent of sample size (Bakeman & Quera, 2011). Yule's *Q* ranges from −1 (perfect negative association) to +1 (perfect positive association) with 0 indicating no association (Klonek et al., 2016). We used the following guidelines to determine the effect size: .00 to .20 (*no association*), .20 to .43 (*weak association*), .43 to .60 (*moderate association*), and .60 to 1.00 (*strong association*; Lloyd, Kennedy, & Yoder, 2013). The same criteria were used for negative associations.

To further test whether mothers and adolescents have a distinct role in driving transitions in emotional states, we used Bayesian model selection for contingency tables (Klugkist, Laudy, & Hoijtink, 2010; Laudy & Hoijtink, 2007). Bayesian model selection for contingency tables is suitable for the comparison of cell probabilities and evaluation of multiple inequality constrained hypotheses (Klugkist et al., 2010). When testing the classical null hypothesis using Fisher's exact test, rejection of the null hypothesis does not necessarily indicate that the alternative hypothesis is true, and it is difficult to prove that the null hypothesis is true (Cohen, 1994). Bayesian model selection compares multiple alternative models and selects the model that is most likely true given the data. Furthermore, the software for Bayesian model selection for contingency tables permits the construction of a three-way contingency table, which makes it possible to compare mothers high and low in internalizing problems within one contingency table (Allison & Liker, 1982).

For the comparison of transitions, we specified transitions as proportions. To illustrate, negativity of the adolescent (lag 0) followed by positivity of the mother (lag 1) was specified as a proportion of all possible responses the mother could have after negativity of the adolescent (positive, neutral and negative). Results of the Bayesian model selection are expressed in Bayes factors (BFs) and posterior model probabilities (PMPs). BFs represent the amount of evidence in favor of the model at hand compared to the unconstrained model, which represents an indefinite set of alternative models that could represent the data. In other words, a higher BF indicates better support for the specified model after observation of the data. The PMPs are probabilities that indicate the best model among the specified models. We compared all our hypotheses to three alternative models: the null model indicating that transitions were equally likely; a model indicating the difference to be in the opposite direction as our hypothesis; and the unconstrained model. If specified restrictions did not converge after 5 hours while running the models, the model could be considered as highly unlikely with a Bayes factor close to 0.00 (Klugkist et al., 2010; Laudy & Hoijtink, 2007). These restrictions were deleted from the model.

We performed sensitivity analyses for the first and second research question by conducting all analyses for three waves separately in addition to the main analyses, where results were pooled across three waves. Due to a small sample size of dyads with mothers high in internalizing problems, we were not able to perform sensitivity analyses for the third research question. Thus, group comparisons for the third research question are based on results pooled across three waves only. We also performed additional analyses to check whether it was necessary to control for gender, educational level of the mother, SES, and the length of the conflict interaction until resolution. Additional analyses revealed that these variables did not influence the results and were therefore not included in the current study. The additional results are available upon request from the first author.

RESULTS

Descriptive Statistics

Means and standard deviations of the frequency of expressed emotions and first-order transitions in emotional states are reported in Table 1. Both mothers and adolescents most expressed neutral emotions. In an absolute sense, adolescents expressed the least positive emotions, whereas mothers expressed the least negative emotions. Repeated measures analysis of variance (ANOVA) on the frequencies of expressed emotions did not reveal differences across waves, except for positive emotions of the mother, $F(2,146) = 9.64$, $p < .001$, which decreased over time. Overall, the expression

of emotions was quite consistent across waves, which indicated that dyadic transitions could be pooled across waves. Furthermore, the number of first-order transitions was found to be stable.

When comparing dyads with mothers high and low in internalizing problems, repeated measures ANOVA revealed that mothers high in internalizing problems expressed significantly fewer negative emotions than mothers low in internalizing problems (M_{low} = 5.10, SE = 0.38, M_{high} = 2.87, SE = 0.81, $F(72,1)$ = 6.20, p = .015). No significant differences were found in the expression of positivity by mothers ($F(72,1)$ = 0.61, p = .439) and adolescents ($F(72,1)$ < 0.01, p = .971), neutrality by mothers ($F(72,1)$ = 1.38, p = .245) and adolescents ($F(72,1)$ = 2.22, p = .140), and the expression of negativity by adolescents ($F(72,1)$ = 3.12, p = .082). The frequency of transitions was nonsignificantly different between both groups (M_{low} = 39.81, SE = 1.96, M_{high} = 32.46, SE = 4.24, $F(72,1)$ = 2.48, p = .120).

First-Order Associations Between Emotional States of the Mother and Adolescent

To answer the first research question, how mother–adolescent dyads make transitions between positive, negative, and neutral emotional states, a contingency table with the frequency of all first-order transitions across three waves was constructed (Table 2). To illustrate, a negative emotional state of the adolescent (lag 0) was followed 114 times by the mother becoming positive (lag 1) while a negative emotional state of the adolescent (lag 0) was followed by a positive emotional state (lag 1) of the adolescent only 17 times. Results indicated that most changes in emotional states happened within mothers and within adolescents, since most positive associations were found within persons. Positivity and negativity of both mothers and adolescents was most likely followed by own neutrality. Positive and negative emotional states mainly impeded change in emotional states of the other person, and neutrality was found to be most likely to provoke change in emotional states of the other person, although these associations were weak in strength. These effects were replicated for all three waves separately (Appendix A).

Differences Between Mothers and Adolescents in Driving Transitions Toward Positivity

In order to answer the second research question, whether mothers are more inclined than adolescents to drive transitions toward positivity, Bayesian model selection was used to select the model that represented the data best. The specified models and results are presented in Table 3. First of all, we hypothesized that mothers are more likely than adolescents to transition to positivity after own or other's negativity (Model 1). Second, we hypothesized that mothers are expected to be more likely than adolescents to transition to neutrality after own and other's negativity (Model 2). Last, we hypothesized that positive and negative emotions are more likely reciprocated by adolescents than by mothers (Models 3a and 3b).

Results revealed that mothers were more likely than adolescents to transition to positivity after own or other's negativity, as indicated by the highest BF and PMP for Model 1.1 (BF = 3.96, PMP = .789). This result was consistently replicated for three waves separately (Appendix B). Furthermore, mothers were more likely than adolescents to reciprocate positive emotional states (model 3a.2:

TABLE 1
Descriptive Statistics and Repeated Measures ANOVAs on All Assessed Variables Separated for Wave 1 (N = 92), Wave 2 (N = 92), and Wave 3 (N = 84)

		Wave 1		*Wave 2*		*Wave 3*		
		M	SD	M	SD	M	SD	F
Expressed emotions[a]								
Adolescent	Negative	6.79	4.79	7.34	6.15	6.80	6.39	0.40
	Neutral	10.11	5.85	10.76	7.56	9.69	6.67	0.98
	Positive	2.48	2.59	2.73	3.10	2.01	1.99	1.48
Mother	Negative	4.83	4.02	5.13	3.89	4.40	3.91	1.10
	Neutral	12.20	5.78	11.52	5.85	10.98	4.84	2.85
	Positive	6.76	4.21	5.36	3.59	5.52	3.35	9.64*
First-order transitions[a]		40.80	20.18	39.86	24.34	37.08	19.50	2.22

Notes. [a]Absolute frequencies.
*Significant at p < .001.

TABLE 2
Joint Frequencies, Adjusted Residuals, Effect Sizes (Yule's Q) and Standard Errors of First-Order Contingencies between Emotional States of the Mother and Adolescent Across Three Waves[a]

		Target Emotion (Lag 1)					
		Adolescent			*Mother*		
Given Emotion (Lag 0)		*Negative*	*Neutral*	*Positive*	*Negative*	*Neutral*	*Positive*
Joint frequencies							
Adolescent	Negative	0	1,290	17	203	229	114
	Neutral	899	0	237	476	397	571
	Positive	20	377	0	18	84	108
Mother	Negative	214	142	13	0	871	34
	Neutral	653	463	228	555	0	751
	Positive	78	154	120	24	1196	0
Adjusted residuals[b]							
Adolescent	Negative	NA	39.74**	−9.97**	−2.81**	−21.16**	−13.16**
	Neutral	16.98**	NA	6.48**	6.87**	−25.46**	5.72**
	Positive	−9.59**	20.61**	NA	−6.72**	−8.96**	2.40*
Mother	Negative	−2.03*	−13.58**	−7.45**	NA	27.77**	−13.42**
	Neutral	1.14	−19.85**	4.07**	9.37**	NA	13.04**
	Positive	−15.64**	−17.19**	3.71**	−14.22**	36.49**	NA
Yule's Q (SE)[c]							
Adolescent	Negative	NA	.88 (0.01)	−.78 (0.05)	−.07 (0.04)	−.49 (0.03)	−.51 (0.04)
	Neutral	.59 (0.02)	NA	.34 (0.04)	.34 (0.03)	−.40 (0.03)	.32 (0.03)
	Positive	−.74 (0.05)	.73 (0.02)	NA	−.65 (0.07)	−.40 (0.05)	.11 (0.05)
Mother	Negative	−.04 (0.04)	−.45 (0.04)	−.74 (0.06)	NA	.79 (0.01)	−.76 (0.04)
	Neutral	.29 (0.03)	−.22 (0.03)	.29 (0.04)	.45 (0.02)	NA	.54 (0.02)
	Positive	−.65 (0.03)	−.52 (0.03)	.17 (0.05)	−.83 (0.03)	.87 (0.01)	NA

Notes. $\chi^2(19) = 5150.73$**.
[a]Similar results were replicated for all three waves separately (Appendix A).
[b]Adjusted residuals indicate whether observed frequencies of transitions significantly deviate from the expected frequencies, interpretation is similar to *z*-scores.
[c]Yule's Q indicates the strength of the effect (independent from sample size), interpretation: .00 to .20 (*no association*), .20 to .43 (*weak association*), .43 to .60 (*moderate association*), and .60 to 1.00 (*strong association*).
*$p < .05$; **$p < .01$.

BF = 2.01, PMP = .668), whereas adolescents were more likely than mothers to reciprocate negative emotional states (Model 3b.1: BF = 1.99, PMP = .665). These results were internally replicated for two out of three waves. Our hypothesis regarding the initiation of neutrality after negativity was not supported as indicated by the BF and PMP for Model 2.1 being close to zero (BF < 0.01, PMP < .001). Sensitivity analyses indicated that mothers and adolescents equally initiated neutrality after negativity.

Differences in First-Order Associations Between Emotional States for Dyads With Mothers High and Low in Internalizing Problems

To examine whether transitions in emotional states differed between dyads with mothers high and low in internalizing problems, we constructed two 6 × 6 contingency tables (Table 4) to examine how emotional states were associated for dyads with mothers high and low in internalizing problems. The chi-square test was significant for both groups (high-internalizing: $\chi^2(19) = 907.20$, $p < .01$, low-internalizing: $\chi^2(19) = 4259.98$, $p < .01$), thus further interpretation of associations between specific emotional states was allowed. In order to compare transitions between mothers high and low in internalizing problems with Bayesian model selection, we constructed a three-way contingency table, in which the frequencies of transitions in both groups were represented separately. The specified models and results are presented in Table 5. We hypothesized that mothers low in internalizing problems were more likely than mothers high in internalizing problems to initiate positivity or neutrality after own or partner's negativity (Models 1 and 2). Also, we expected that mothers low in internalizing problems were more likely than mothers high in internalizing problems to

TABLE 3
Bayesian Model Selection Pooled Across Three Waves[d] (N = 268): Comparison of Multiple Sets of Inequality Constrained Hypotheses

	Model Comparison	
Models	*BF*	*PMP*
Model 1		
1. A_{neg} or $M_{neg} \rightarrow M_{pos} > M_{neg}$ or $A_{neg} \rightarrow A_{pos}$	3.96	.789
2. A_{neg} or $M_{neg} \rightarrow M_{pos} < M_{neg}$ or $A_{neg} \rightarrow A_{pos}$	<0.01[b]	<.001
3. A_{neg} or $M_{neg} \rightarrow M_{pos} = M_{neg}$ or $A_{neg} \rightarrow A_{pos}$	0.06[b]	.012
4. Unconstrained model	1[a]	.199
Model 2		
1. A_{neg} or $M_{neg} \rightarrow M_{neu} > M_{neg}$ or $A_{neg} \rightarrow A_{neu}$	<0.01	<.001
2. A_{neg} or $M_{neg} \rightarrow M_{neu} < M_{neg}$ or $A_{neg} \rightarrow A_{neu}$	0.60	.342
3. A_{neg} or $M_{neg} \rightarrow M_{neu} = M_{neg}$ or $A_{neg} \rightarrow A_{neu}$	0.15	.085
4. Unconstrained model	1[a]	.573
Model 3a		
1. $M_{pos} \rightarrow A_{pos} > A_{pos} \rightarrow M_{pos}$	<0.01	<.001
2. $M_{pos} \rightarrow A_{pos} < A_{pos} \rightarrow M_{pos}$	2.01	.668
3. $M_{pos} \rightarrow A_{pos} = A_{pos} \rightarrow M_{pos}$	<0.01	.003
4. Unconstrained model	1[a]	.332
Model 3b		
1. $M_{neg} \rightarrow A_{neg} > A_{neg} \rightarrow M_{neg}$	1.99	.665
2. $M_{neg} \rightarrow A_{neg} < A_{neg} \rightarrow M_{neg}$	<0.01[c]	NA
3. $M_{neg} \rightarrow A_{neg} = A_{neg} \rightarrow M_{neg}$	<0.01	<.001
4. Unconstrained model	1[a]	.335

Notes. A, adolescent; M, Mother; neg, negative emotional state; pos, positive emotional state; neu, neutral emotional state; BF, Bayes factor; PMP, posterior model probability.
[a]Unconstrained model is reference category.
[b]One out of two restrictions did not converge and was therefore deleted from the model.
[c]Restriction did not converge and was therefore deleted from the model.
[d]Similar results were replicated for all three waves separately (Appendix B).

reciprocate positivity of the adolescent (Model 3a) and less likely to reciprocate negativity of the adolescent (Model 3b). We explored the same hypotheses for responses of adolescents.

Results indicated that there were no differences in responses of the mothers between dyads with mothers high and low in internalizing problems. The hypothesis that mothers low in internalizing problems are less likely than mothers high in internalizing problems to reciprocate negativity found some support, yet the support for this model was equal to the support for the model indicating no differences in responses. Therefore, based on these results we cannot conclude that mothers high and low in internalizing problems differ in the reciprocation of negativity. Adolescents' initiation of positivity or neutrality after own or mothers' negativity did not differ between groups. However, adolescents with mothers low in internalizing problems were more likely to reciprocate negativity and positivity of the mother than adolescents with mothers high in internalizing problems. However, for reciprocity of positivity, the support was equal to that for the model indicating no differences in responses. Therefore, we concluded that adolescents with mothers high and low in internalizing problems only differ in the reciprocation of negativity, though they do not differ in the reciprocation of positivity.

DISCUSSION

The aim of this study was to examine (1) how mother–adolescent dyads successfully make transitions in emotional states during conflict interactions, (2) whether mothers are more inclined than adolescents to drive transitions toward positivity after negativity and (3) whether mothers high in emotion regulation problems show less adaptive interaction patterns than mothers low in emotion regulation problems. By performing internal replication analyses, the present study rigorously indicated that mothers play a more important role than adolescents in preventing conflict interactions from becoming rigidly negative. We found that mothers are more likely than adolescents to initiate positivity after negativity and to reciprocate positivity, whereas adolescents are more likely than mothers

TABLE 4
Effect Sizes (Yule's Q) and Standard Errors of First-Order Contingencies Between Emotional States of the Mother and Adolescent Across Three Waves Separated for High-Internalizing Dyads and Low-Internalizing Dyads

		Target Emotion (Lag 1)					
		Adolescent			*Mother*		
Given Emotion (Lag 0) Yule's Q (SE)		*Negative*	*Neutral*	*Positive*	*Negative*	*Neutral*	*Positive*
High-Internalizing[a]							
Adolescent	Negative	NA	.88 (0.02)	−.84 (0.01)	.17 (0.09)	−.55 (0.07)	−.61 (0.08)
	Neutral	.66 (0.04)	NA	.36 (0.09)	.22 (0.08)	−.43 (0.06)	.34 (0.06)
	Positive	−.63 (0.13)	.69 (0.06)	NA	−.70 (0.16)	−.38 (0.12)	.09 (0.13)
Mother	Negative	−.09 (0.11)	−.35 (0.10)	−.37 (0.19)	NA	.74 (0.04)	−.77 (0.09)
	Neutral	.23 (0.06)	−.21 (0.07)	.33 (0.10)	.41 (0.07)	NA	.59 (0.04)
	Positive	−.68 (0.08)	−.54 (0.07)	−.10 (0.14)	−.90 (0.06)	.91 (0.01)	NA
Low-Internalizing							
Adolescent	Negative	NA	.88 (0.01)	−.77 (0.05)	−.11 (0.04)	−.48 (0.03)	−.49 (0.04)
	Neutral	.57 (0.02)	NA	.33 (0.04)	.36 (0.03)	−.40 (0.03)	.32 (0.03)
	Positive	−.76 (0.05)	.73 (0.02)	NA	−.65 (0.07)	−.40 (0.05)	.11 (0.06)
Mother	Negative	−.03 (0.04)	−.46 (0.04)	−.81 (0.06)	NA	.79 (0.01)	−.76 (0.04)
	Neutral	.30 (0.03)	−.22 (0.03)	.28 (0.04)	.46 (0.03)	NA	.53 (0.02)
	Positive	−.65 (0.04)	−.51 (0.04)	.22 (0.05)	−.81 (0.04)	.86 (0.01)	NA

[a]Due to a small sample size, results could not be replicated for every wave separately.

to reciprocate negativity. No support was found for mothers high in internalizing problems driving less adaptive interaction patterns compared to mothers low in internalizing problems. However, we did find that adolescents with mothers low in internalizing problems were more likely to reciprocate negativity than adolescents with mothers high in internalizing problems. Overall, our findings underline the importance of mothers' active role in regulating negative emotions into positive emotions because adolescents are more likely to maintain rigid and dysfunctional interaction patterns of negativity.

In line with social learning theory (Bandura, 1977) and previous studies (e.g., Fletcher et al., 1996; Granic & Lamey, 2002), our study indicated that mothers model adaptive regulation strategies by initiating positivity. The tendency of mothers to initiate positivity to turn interactions from negative into positive could be due to better developed emotion regulation strategies of mothers compared to adolescents (Morris et al., 2007). An additional explanation could be that mothers have greater perseverance in solving conflicts since they are found to experience more negative consequences for their well-being due to conflicts than adolescents (Steinberg & Morris, 2001). Because adolescents are more likely to reciprocate negative emotions than mothers, conflicts are more likely to get stuck in negativity if adolescents have to initiate resolution instead of mothers (Moed et al., 2015). For this reason, mothers should take an active role in resolving conflicts and modeling effective regulation strategies, instead of sitting out the negative moods of their adolescents. Nevertheless, it is important to note that negative behavior of the adolescent could be considered as common adolescent behavior. The high prevalence of negative emotional states of the adolescent and the tendency to reciprocate negativity could be seen as an attempt to negotiate more mature privileges, which is in line with expectancy violation realignment theory and the dynamic systems approach (Collins, 1995; Granic & Patterson, 2006).

Despite the differences we found between mothers and adolescents in responding with negative or positive emotions after negativity, most transitions in emotional states happen within persons themselves. Where positive and negative emotions mainly impede emotional responses of the other, neutral emotional states give most opportunity to respond. While we found that adolescents are more likely than mothers to reciprocate negativity and that mothers are more likely than adolescents to reciprocate positivity, the actual effect sizes of first-order reciprocation responses were much smaller than expected based on earlier research (Fletcher et al., 1996) that only examined transitions between persons. Neutral emotional states could be an interim in transitions between positive and

TABLE 5
Bayesian Model Selection for the Comparison of Mothers High (N = 49) and Low (N = 219) in Internalizing Problems, Pooled Across Three Waves

	Model Comparison	
	BF	*PMP*
Mothers' responses – (H)igh-internalizing versus (L)ow-internalizing dyads		
Model 1		
1. (L)A_{neg} or (L)M_{neg} → (L)M_{pos} > (H)M_{neg} or (H)A_{neg} → (H)M_{pos}	0.97	.009
2. (L)A_{neg} or (L)M_{neg} → (L)M_{pos} < (H)M_{neg} or (H)A_{neg} → (H)M_{pos}	0.67	.006
3. (L)A_{neg} or (L)M_{neg} → (L)M_{pos} = (H)M_{neg} or (H)A_{neg} → (H)M_{pos}	105.65	.976
4. Unconstrained model	1[a]	.009
Model 2		
1. (L)A_{neg} or (L)M_{neg} → (L)M_{neu} > (H)M_{neg} or (H)A_{neg} → (H)M_{neu}	2.22	.031
2. (L)A_{neg} or (L)M_{neg} → (L)M_{neu} < (H)M_{neg} or (H)A_{neg} → (H)M_{neu}	0.22	.003
3. (L)A_{neg} or (L)M_{neg} → (L)M_{neu} = (H)M_{neg} or (H)A_{neg} → (H)M_{neu}	67.72	.952
4. Unconstrained model	1[a]	.014
Model 3a		
1. (L)A_{pos} → (L)M_{pos} > (H)A_{pos} → (H)M_{pos}	0.82	.128
2. (L)A_{pos} → (L)M_{pos} < (H)A_{pos} → (H)M_{pos}	1.19	.186
3. (L)A_{pos} → (L)M_{pos} = (H)A_{pos} → (H)M_{pos}	3.38	.530
4. Unconstrained model	1[a]	.157
Model 3b		
1. (L)A_{neg} → (L)M_{neg} < (H)A_{neg} → (H)M_{neg}	1.84	.380
2. (L)A_{neg} → (L)M_{neg} > (H)A_{neg} → (H)M_{neg}	0.14	.029
3. (L)A_{neg} → (L)M_{neg} = (H)A_{neg} → (H)M_{neg}	1.87	.358
4. Unconstrained model	1[a]	.206
Adolescents' responses – (H)igh-internalizing versus (L)ow-internalizing dyads		
Model 1		
1. (L)M_{neg} or (L)A_{neg} → (L)A_{pos} > (H)A_{neg} or (H)M_{neg} → (H)A_{pos}	0.03	.001
2. (L)M_{neg} or (L)A_{neg} → (L)A_{pos} < (H)A_{neg} or (H)M_{neg} → (H)A_{pos}	1.47	.029
3. (L)M_{neg} or (L)A_{neg} → (L)A_{pos} = (H)A_{neg} or (H)M_{neg} → (H)A_{pos}	47.56	.950
4. Unconstrained model	1[a]	.020
Model 2		
1. (L)M_{neg} or (L)A_{neg} → (L)A_{neu} > (H)A_{neg} or (H)M_{neg} → (H)A_{neu}	0.43	.003
2. (L)M_{neg} or (L)A_{neg} → (L)A_{neu} < (H)A_{neg} or (H)M_{neg} → (H)A_{neu}	1.77	.011
3. (L)M_{neg} or (L)A_{neg} → (L)A_{neu} = (H)A_{neg} or (H)M_{neg} → (H)A_{neu}	152.88	.979
4. Unconstrained model	1[a]	.006
Model 3a		
1. (L)M_{pos} → (L)A_{pos} > (H)M_{pos} → (H)A_{pos}	1.89	.386
2. (L)M_{pos} → (L)A_{pos} < (H)M_{pos} → (H)A_{pos}	0.11	.023
3. (L)M_{pos} → (L)A_{pos} = (H)M_{pos} → (H)A_{pos}	1.89	.387
4. Unconstrained model	1[a]	.205
Model 3b		
1. (L)M_{neg} → (L)A_{neg} < (H)M_{neg} → (H)A_{neg}	0.12	.028
2. (L)M_{neg} → (L)A_{neg} > (H)M_{neg} → (H)A_{neg}	1.89	.445
3. (L)M_{neg} → (L)A_{neg} = (H)M_{neg} → (H)A_{neg}	1.24	.291
4. Unconstrained model	1[a]	.235

A, adolescent; M, mother; neg, negative emotional state; pos, positive emotional state; neu, neutral emotional state; BF, Bayes factor; PMP, posterior model probability.
[a]Unconstrained model is reference category.

negative emotional states (Dishion et al., 1995; Lunkenheimer et al., 2011). Therefore, stronger reciprocation effects are likely to appear delayed as second- or third-order transitions, which might be interesting to examine further in future research. Most importantly, these findings draw attention to the importance of examining within-person transitions in addition to between-person transitions and correcting for auto dependence to get a more accurate understanding of real-time interactional processes (Dumas, 1986).

Although many of the study's hypotheses received support, we did not find that mothers high in internalizing problems have more

difficulties in initiating positivity after negativity than mothers low in internalizing problems. Also, we could not conclude that mothers high in internalizing problems differed in their reciprocation of negativity from mothers low in internalizing problems, although more detailed inspection of effects indicates a possible existence of a trend of more negative reciprocity by mothers high in internalizing problems. We expected differences to be more distinct based on earlier findings showing that elevated levels of depression and anxiety are associated with more negative reactivity (Dix & Meunier, 2009; Downey & Coyne, 1990; Mennin et al., 2007). The lack of differences in responses of mothers high and low in internalizing problems could be explained by the relatively homogeneous, healthy sample that we used in the present study. Since internalizing problems did not reach clinical levels, variation in emotional functioning of mothers in our sample might have been too small to find clear distinctions in emotional responses of the mothers.

While we were not able to demonstrate clear differences in responses of mothers high and low in internalizing problems, we did find one unexpected difference in the responses of the adolescents. Adolescents with mothers low in internalizing problems were more likely to reciprocate negativity than adolescents with mothers high in internalizing problems, while we expected that maternal internalizing problems would mainly influence emotional responses of the mother. The first and most straightforward explanation for the difference in reciprocation of negativity by adolescents could be found in mothers high in internalizing problems expressing less negative emotions than mothers low in internalizing problems, which gives adolescents with mothers high in internalizing problems few opportunities to reciprocate negativity (Fletcher et al., 1996). A second explanation could be that adolescents with mothers high in internalizing problems adopt a caretaking role. This role is characterized by decreasing aggressive responses in reaction to maternal depressive behavior in problem-solving interactions (Davis, Sheeber, Hops, & Tildesley, 2000). A third explanation might be that although mothers high in internalizing problems express less negativity than mothers low in internalizing problems, they may be more susceptible for negativity of adolescents and therefore more likely to drive negative reciprocity instead of adolescents. Future research should examine the existence of this suggested interaction process for mothers with more elevated levels of emotional problems. Also, it might be insightful to distinguish aggressive and internalizing negative behaviors to assess a possible caretaking role of adolescents.

The finding that mothers high in internalizing problems expressed less negative emotions than mothers low in internalizing problems was also somewhat unexpected given earlier research showing positive associations with negative reactivity (Dix & Meunier, 2009; Mennin et al., 2007). However, this finding is consistent with the emotion context insensitivity theory of depression, which suggests that negative mood states, for example when one experiences internalizing problems, broadly diminish motivated actions. As a result, mothers with internalizing problems may be less sensitive to the demands of a conflictual context and therefore express less negative emotions (Rottenberg & Hindash, 2015). Moreover, if negative feelings are not expressed they might become more self-directed and contribute to internalizing problems (Gross, 1999). Some research found associations between depressive symptoms and self-reports of high internal feelings of negativity while displaying low levels of negativity during interactions (Chaplin, 2006), indicating that it is important to consider a possible discrepancy between internal experiences of emotions and emotional expression during interactions.

Limitations and Future Directions

Despite important strengths of our study, including the internal replication of results and the contribution in advancing our understanding about real-time conflict behaviors by applying a micro-analytic approach, the present study has some limitations. First of all, we used a homogeneous sample of Caucasian middle-class families, so a lack of diversity in ethnicity and socioeconomic status in our sample should be taken into account as an important limitation. Mothers who had completed higher education were oversampled in comparison to the general Dutch population. Also, diversity in ethnicity was low since a good understanding of the written Dutch language was an inclusion criterion, which limits generalizability of findings to families with different ethnic backgrounds because the expression of emotions is suggested to be dependent on cultural factors (Ryan, La Guardia, Solky-Butzel, Chirkov, & Kim, 2005). Second, our study is limited by solely looking at event sequences and not being able to take the duration of events into account due to a lack of power. The duration of events can be informative of interaction

patterns over and above the sequence of events. For example, a long duration of negative reciprocity can become an *absorbing state* which is resistant to change and conflict resolution (Gottman, 1994; Morelen & Suveg, 2012). Therefore, considering duration of events would be an interesting direction for future research. Third, by examining transitions in emotional states between mothers and adolescents, we potentially ignored the contribution of fathers in emotional dynamics of families. An interesting direction for future research could be to examine fathers' role in regulating emotions in conflict interactions with adolescents. Fourth, since more severe levels of emotional problems in our sample were not very prevalent, the sample size of the group of mothers that were high in internalizing problems was rather small. Therefore, replication of group comparisons was not possible for three waves separately and statistical power was possibly insufficient to detect differences in emotional responses of dyads with mothers high and low in internalizing problems. Also, analyses using contingency tables are greatly dependent on the frequency of events of interest (Allison & Liker, 1982). Therefore, our comparison of groups could be biased due to a large difference in sample size. However, by pooling results across multiple waves we were able to obtain reliable statistic parameters for both groups. Furthermore, interpretation of our results was based on effect sizes independent of sample size. Future research should further examine the influence of emotional functioning on interaction patterns with mothers who have more severe levels of emotion regulation problems because we showed that mothers have a leading role in regulating emotions in conflicts with adolescents.

CONCLUSION AND IMPLICATIONS

To conclude, the present study extended our knowledge about real-time conflict interaction processes between mothers and adolescents (1) by directly testing and showing that mothers have a role distinct from adolescents in driving transitions in emotions and (2) by demonstrating the importance of acknowledging within-person transitions in emotional states in order to get an accurate understanding of real-time interaction processes. Although we did not find that mothers high in internalizing problems showed less adaptive interaction processes than mothers low in internalizing problems, we found a possible trend of maternal internalizing problems influencing the reciprocation of negativity by mothers. The application of a micro-analytic approach is a first step in providing mothers with practical and concrete tips in how to deal adaptively with conflicts during adolescence (Klonek et al., 2016). Perhaps the most important lesson to be learned from this study is that, whereas adolescents tend to maintain negativity, mothers have a leading role in regulating negative emotions toward positive emotions. This indicates that an active role of mothers in regulating conflict interactions with adolescents is desirable: conflicts are more likely to get stuck in maladaptive cycles of negativity if adolescents rather than mothers have to initiate positivity.

REFERENCES

Achenbach, T. M., & Rescorla, L. A. (2003). *Manual for the ASEBA adult forms and profiles*. Burlington: Research Center for Children, Youth, & Families, University of Vermont.

Allison, P. D., & Liker, J. K. (1982). Analyzing sequential categorical data on dyadic interaction: Comment on Gottman. *Psychological Bulletin*, *91*, 393–403. https://doi.org/10.1037/0033-2909.91.2.393

Almeida, D. M., Wethington, E., & Chandler, A. L. (1999). Daily transmission of tensions between marital dyads and parent–child dyads. *Journal of Marriage and the Family*, *61*, 49–61. https://doi.org/10.2307/353882

Bakeman, R., Adamson, L. B., & Strisik, P. (1989). Lags and logs: Statistical approaches to interaction. In M. H. Bornstein & J. Bruner (Eds.), *Interaction in human development* (pp. 111–127). Hillsdale, NJ: Lawrence Erlbaum.

Bakeman, R., & Quera, V. (2000). OTS: A program for converting Noldus Observer data files to SDIS files. *Behavior Research Methods, Instruments, and Computers*, *32*, 207–212. https://doi.org/10.3758/BF03200803

Bakeman, R., & Quera, V. (2011). *Sequential analysis and observational methods for the behavioral sciences*. New York, NY: Cambridge University Press. https://doi.org/10.1017/CBO9781139017343

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Butler, E. A. (2011). Temporal interpersonal emotion systems: The "TIES" that form relationships. *Personality and Social Psychology Review*, *15*, 367–393. https://doi.org/10.1177/1088868311411164

Celeux, G., & Soromenho, G. (1996). An entropy criterion for assessing the number of clusters in a mixture model. *Journal of Classification*, *13*, 195–212. https://doi.org/10.1007/BF01246098

Chaplin, T. M. (2006). Anger, happiness, and sadness: Associations with depressive symptoms in late adolescence. *Journal of Youth and Adolescence*, *35*, 977–986. https://doi.org/10.1007/s10964-006-9033-x

Cohen, J. (1994). The earth is round ($p < .05$). *American Psychologist*, *49*, 997–1003. https://doi.org/10.1037/0003-066X.49.12.997

Collins, W. A. (1995). Relationships and development: Family adaptation to individual change. In S. Shulman (Ed.), *Close relationships and socioemotional development* (pp. 129–155). New York, NY: Ablex.

Collins, W. A. (1997). Relationships and development during adolescence: Interpersonal adaptation to individual change. *Personal Relationships*, *4*, 1–14. https://doi.org/10.1111/j.1475-6811.1997.tb00126.x

Collins, W. A., & Laursen, B. (2004). Parent–adolescent relationships and influences. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (2nd ed., pp. 331–362). Hoboken, NJ: Wiley.

Conger, R. D., & Ge, X. (1999). Conflict and cohesion in parent–adolescent relations: Changes in emotional expression from early to mid-adolescence. In M. J. Cox & J. Brooks-Gunn (Eds.), *Conflict and cohesion in families: Causes and consequences* (pp. 185–206). Mahwah, NJ: Lawrence Erlbaum.

Davis, B., Sheeber, L., Hops, H., & Tildesley, E. (2000). Adolescent responses to depressive parental behaviors in problem-solving interactions: Implications for depressive symptoms. *Journal of Abnormal Child Psychology*, *28*, 451–465. https://doi.org/10.1023/A:1005183622729

De Goede, I. H. A., Branje, S., & Meeus, W. (2009). Developmental changes in adolescents' perceptions of relationships with their parents. *Journal of Youth and Adolescence*, *38*, 75–88. https://doi.org/10.1007/s10964-008-9286-7

Dishion, T. J., Andrews, D. W., & Crosby, L. (1995). Antisocial boys and their friends in early adolescence: Relationship characteristics, quality, and interactional process. *Child Development*, *66*, 139–151. https://doi.org/10.1111/j.1467-8624.1995.tb00861.x

Dix, T., & Meunier, L. N. (2009). Depressive symptoms and parenting competence: An analysis of 13 regulatory processes. *Developmental Review*, *29*, 45–68. https://doi.org/68.10.1016/j.dr.2008.11.002

Downey, G., & Coyne, J. C. (1990). Children of depressed parents: An integrative review. *Psychological Bulletin*, *108*, 50–76. https://doi.org/10.1037/0033-2909.108.1.50

Dumas, J. E. (1986). Controlling for autocorrelation in social interaction analysis. *Psychological Bulletin*, *100*, 125–127. https://doi.org/10.1037/0033-2909.100.1.125

Dumas, J. E., Lemay, P., & Dauwalder, J. P. (2001). Dynamic analyses of mother–child interactions in functional and dysfunctional dyads: A synergetic approach. *Journal of Abnormal Child Psychology*, *29*, 317–329. https://doi.org/0091-0627/01/0800-031719.50/0

Fletcher, K. E., Fischer, M., Barkley, R. A., & Smallish, L. (1996). A sequential analysis of the mother–adolescent interactions of ADHD, ADHD/ODD, and normal teenagers during neutral and conflict discussions. *Journal of Abnormal Child Psychology*, *24*, 271–297. https://doi.org/10.1007/BF01441632

Gottman, J. M. (1994). *What predicts divorce?*. Hillsdale, NJ: Lawrence Erlbaum.

Gottman, J., McCoy, K., Coan, J., & Collier, H. (1996). *The SPecific AFFect coding system (SPAFF) for observing emotional communication in marital and family interaction*. Mahwah, NJ: Lawrence Erlbaum.

Granic, I., Hollenstein, T., Dishion, T. J., & Patterson, G. R. (2003). Longitudinal analysis of flexibility and reorganization in early adolescence: A dynamic systems study of family interactions. *Developmental Psychology*, *39*, 606–617. https://doi.org/10.1037/0012-1649.39.3.606

Granic, I., & Lamey, A. V. (2002). Combining dynamic systems and multivariate analyses to compare the mother–child interactions of externalizing subtypes. *Journal of Abnormal Child Psychology*, *30*, 265–283. https://doi.org/10.1023/A:1015106913866

Granic, I., & Patterson, G. R. (2006). Toward a comprehensive model of antisocial development: A dynamic systems approach. *Psychological Review*, *113*, 101–131. https://doi.org/10.1037/0033-295X.113.1.101

Gross, J. J. (1999). Emotion regulation: Past, present and future. *Cognition and Emotion*, *13*, 551–573. https://doi.org/10.1080/026999399379186

Haberman, S. J. (1979). *Analysis of qualitative data* (vol. *2*. New York, NY: Academic Press.

Hadiwijaya, H., Klimstra, T. A., Vermunt, J. K., Branje, S. J. T., & Meeus, W. H. J. (2017). On the development of harmony, turbulence, and independence in parent–adolescent relationships: A five-wave longitudinal study. *Journal of Youth and Adolescence*, *46*, 1772–1788. https://doi.org/10.1007/s10964-016-0627-7

Hollenstein, T., Lichtwarck-Aschoff, A., & Potworowski, G. (2013). A model of socioemotional flexibility at three time scales. *Emotion Review*, *5*, 397–405. https://doi.org/10.1177/1754073913484181

Kim, K. J., Conger, R. D., Lorenz, F. O., & Elder, G. H. (2001). Parent–adolescent reciprocity in negative affect and its relation to early adult social development. *Developmental Psychology*, *37*, 775–790. https://doi.org/10.1037/0012-1649.37.6.775

Klonek, F. E., Quera, V., Burba, M., & Kauffeld, S. (2016). Group interactions and time: Using sequential analysis to study group dynamics in project meetings. *Group Dynamics: Theory, Research, and Practice*, *20*, 209–222. https://doi.org/10.1037/gdn0000052

Klugkist, I., Laudy, O., & Hoijtink, H. (2010). Bayesian evaluation of inequality and equality constrained hypotheses for contingency tables. *Psychological Methods*, *15*, 281–299. https://doi.org/10.1037/a0020137

Krebs, K. K. (2000). Comparison of macro and micro observational methods of measuring marital social support. *Retrospective Theses and Dissertations*. Retrieved from https://lib.dr.iastate.edu/rtd/12694

Larson, R. W., & Almeida, D. M. (1999). Emotional transmission in the daily lives of families: A new paradigm for studying family process. *Journal of Marriage and the Family*, *61*, 5–20. https://doi.org/10.2307/353879

Larson, R. W., & Gillman, S. (1999). Transmission of emotions in the daily interactions of single-mother families. *Journal of Marriage and the Family*, *61*, 21–37. https://doi.org/10.2307/353880

Laudy, O., & Hoijtink, H. (2007). Bayesian methods for the analysis of inequality constrained contingency tables. *Statistical Methods in Medical Research*, *16*, 123–138. https://doi.org/10.1177/0962280206071925

Laursen, B. (1995). Conflict and social interaction in adolescent relationships. *Journal of Research on Adolescence*, *5*, 55–70. https://doi.org/10.1207/s15327795jra0501_3

Laursen, B., & Collins, W. A. (1994). Interpersonal conflict during adolescence. *Psychological Bulletin*, *115*, 197–209. https://doi.org/10.1037/0033-2909.115.2.197

Lloyd, B. P., Kennedy, C. H., & Yoder, P. J. (2013). Quantifying contingent relations from direct observation data: Transitional probability comparisons versus Yule's Q. *Journal of Applied Behavior Analysis*, *46*, 479–497. https://doi.org/10.1002/jaba.45

Lougheed, J., & Hollenstein, T. (2016). Socioemotional flexibility in mother–daughter dyads: Riding the emotional rollercoaster across positive and negative contexts. *Emotion*, *16*, 620–633. https://doi.org/10.1037/emo0000155

Lougheed, J., Hollenstein, T., & Lewis, M. D. (2016). Maternal regulation of daughters' emotion during conflicts from early to mid-adolescence. *Journal of Research on Adolescence*, *26*, 610–616. https://doi.org/10.1111/jora.12211

Lunkenheimer, E. S., Hollenstein, T., Wang, J., & Shields, A. M. (2012). Flexibility and attractors in context: Family emotion socialization patterns and children's emotions regulation in late childhood. *Nonlinear Dynamics, Psychology, and Life Sciences*, *16*, 269–291.

Lunkenheimer, E. S., Olson, S. L., Hollenstein, T., Sameroff, A. J., & Winter, C. (2011). Dyadic flexibility and positive affect in parent–child coregulation and the development of child behavior problems. *Development and Psychopathology*, *23*, 577–591. https://doi.org/10.1017/S095457941100006X

Lunkenheimer, E. S., Shields, A. M., & Cortina, K. S. (2007). Parental coaching and dismissing of children's emotions in family interaction. *Social Development*, *16*, 232–248. https://doi.org/10.1111/j.1467-9507.2007.00382.x

Mennin, D. S., Holaway, R. M., Fresco, D. M., Moore, M. T., & Heimberg, R. G. (2007). Delineating components of emotion and its dysregulation in anxiety and mood psychopathology. *Behavior Therapy*, *38*, 284–302. https://doi.org/10.1016/j.beth.2006.09.001

Moed, A., Gershoff, E. T., Eisenberg, N., Hofer, C., Losoya, S., Spinrad, T. L., & Liew, J. (2015). Parent–adolescent conflict as sequences of reciprocal negative emotion: Links with conflict resolution and adolescents' behavior problems. *Journal of Youth and Adolescence*, *44*, 1607–1622. https://doi.org/10.1007/s10964-014-0209-5

Morelen, D., & Suveg, C. (2012). A real-time analysis of parent–child emotion discussions: The interaction is reciprocal. *Journal of Family Psychology*, *26*, 998–1003. https://doi.org/10.1037/a0030148

Morris, A. S., Silk, J. S., Steinberg, L., Myers, S. S., & Robinson, L. R. (2007). The role of the family context in the development of emotion regulation. *Social Development*, *16*, 361–388. https://doi.org/10.1111/j.1467-9507.2007.00389.x

Muthén, L. K., & Muthén, B. O. (1998–2012). *Mplus user's guide* (7th ed.). Los Angeles, CA: Muthén & Muthén.

Patterson, G. R. (1982). *Coercive family processes*. Eugene, OR: Castalia.

Raver, C. C., & Spagnola, M. (2003). "When my mommy was angry, I was speechless": Children's perceptions of maternal emotional expressiveness within the context of economic hardship. *Marriage and Family Review*, *34*, 63–88. https://doi.org/10.1300/J002v34n01_04

Rottenberg, J., & Hindash, A. C. (2015). Emerging evidence for emotion context insensitivity in depression. *Current Opinion in Psychology*, *4*, 1–5. https://doi.org/10.1016/j.copsyc.2014.12.025

Ryan, R. M., La Guardia, J. G., Solky-Butzel, J., Chirkov, V., & Kim, Y. (2005). On the interpersonal regulation of emotions: Emotional reliance across gender, relationships, and cultures. *Personal Relationships*, *12*, 145–163. https://doi.org/10.1111/j.1350-4126.2005.00106.x

Sheeber, L., Allen, N., Davis, B., & Sorensen, E. (2000). Regulation of negative affect during mother–child problem-solving interactions: Adolescent depressive status and family processes. *Journal of Abnormal Child Psychology*, *28*, 467–479. https://doi.org/10.1023/A:1005135706799

Slesnick, N., & Waldron, H. B. (1997). Interpersonal problem solving interactions of depressed adolescents and their parents. *Journal of Family Psychology*, *11*, 234–245. https://doi.org/10.1037/0893-3200.11.2.234

Smetana, J. G. (2011). Adolescents' social reasoning and relationships with parents: Conflicts and coordinations within and across domains. In E. Amsel & J. Smetana (Eds.), *Adolescent vulnerabilities and opportunities: Constructivist and developmental perspectives* (pp. 139–158). New York, NY: Cambridge University Press. https://doi.org/10.1017/CBO9781139042819

Steinberg, L., & Morris, A. S. (2001). Adolescent development. *Annual Review of Psychology*, *52*, 83–110. https://doi.org/10.1146/annurev.psych.52.1.83

Thompson, R. A., & Meyer, S. (2007). Socialization of emotion regulation in the family. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 249–268). New York, NY: Guilford Press.

Van de Schoot, R., Sijbrandij, M., Winter, S. D., Depaoli, S., & Vermunt, J. K. (2016). The GRoLTS Checklist: Guidelines for reporting on latent trajectory studies. *Structural Equation Modeling: A Multidisciplinary Journal*, *24*, 451–467. https://doi.org/10.1080/10705511.2016.1247646

Van der Giessen, D., Branje, S. J. T., Frijns, T., & Meeus, W. H. J. (2013). Dyadic variability in mother–adolescent interactions: Developmental trajectories and associations with psychosocial functioning. *Journal of Youth and Adolescence*, *42*, 96–108. https://doi.org/10.1007/s10964-012-9790-7

Van der Giessen, D., Hollenstein, T., Hale, W. W., Koot, H. M., Meeus, W., & Branje, S. (2015). Emotional

variability in mother-adolescent conflict interactions and internalizing problems of mothers and adolescents: Dyadic and individual processes. *Journal of Abnormal Child Psychology*, *43*, 339–353. https://doi.org/10.1007/s10802-014-9910-9

Walle, E. A., & Campos, J. J. (2012). Interpersonal responding to discrete emotions: A functionalist approach to the development of affect specificity. *Emotion Review*, *4*, 413–422. https://doi.org/10.1177/1754073912445812

Weiss, R. L., & Heyman, R. E. (1990). Observation of marital interaction. In F. D. Fincham & T. N. Bradbury (Eds.), *The psychology of marriage: Basic issues and applications* (pp. 87–117). New York, NY: Guilford Press.

Yoder, P. J., & Symons, F. J. (2010). *Observational measurement of behavior*. New York, NY: Springer.

APPENDIX A

TABLE A1
Effect Sizes (Yule's *Q*) and Standard Errors of First-Order Contingencies Between Emotional States of the Mother and Adolescent Separated for Three Waves

		Target Emotion (Lag 1)					
		Adolescent			*Mother*		
Given Emotion (Lag 0) Yule's Q (SE)		*Negative*	*Neutral*	*Positive*	*Negative*	*Neutral*	*Positive*
Wave 1[a]							
Adolescent	Negative	NA	.87 (0.01)	−.84 (0.07)	−.18 (0.07)	−.42 (0.05)	−.43 (0.06)
	Neutral	.53 (0.03)	NA	.39 (0.06)	.34 (0.05)	−.40 (0.04)	.34 (0.04)
	Positive	−.67 (0.09)	.70 (0.04)	NA	−.63 (0.11)	−.33 (0.08)	.08 (0.09)
Mother	Negative	.13 (0.06)	−.53 (0.06)	−.63 (0.11)	NA	.74 (0.02)	−.68 (0.07)
	Neutral	.25 (0.04)	−.15 (0.05)	.24 (0.07)	.48 (0.04)	NA	.52 (0.03)
	Positive	−.58 (0.06)	−.48 (0.05)	.12 (0.08)	−.69 (0.06)	.86 (0.01)	NA
Wave 2[b]							
Adolescent	Negative	NA	.86 (0.01)	−.66 (0.09)	<.01 (0.06)	−.50 (0.05)	−.47 (0.07)
	Neutral	.58 (0.03)	NA	.25 (0.07)	.35 (0.05)	−.32 (0.04)	.33 (0.05)
	Positive	−.89 (0.06)	.76 (0.03)	NA	−.52 (0.12)	−.43 (0.08)	.08 (0.10)
Mother	Negative	−.05 (0.07)	−.35 (0.06)	−.89 (0.07)	NA	.78 (0.02)	−.78 (0.06)
	Neutral	.34 (0.04)	−.22 (0.05)	.31 (0.07)	.40 (0.04)	NA	.51 (0.04)
	Positive	−.70 (0.06)	−.50 (0.06)	.31 (0.08)	−.91 (0.04)	.86 (0.01)	NA
Wave 3[c]							
Adolescent	Negative	NA	.91 (0.01)	−.86 (0.07)	−.03 (0.07)	−.57 (0.05)	−.66 (0.06)
	Neutral	.66 (0.03)	NA	.38 (0.07)	.32 (0.05)	−.50 (0.04)	.31 (0.05)
	Positive	−.65 (0.10)	.72 (0.04)	NA	−.92 (0.06)	−.45 (0.09)	.18 (0.10)
Mother	Negative	−.24 (0.08)	−.48 (0.07)	−.71 (0.12)	NA	.84 (0.02)	−.85 (0.06)
	Neutral	.26 (0.05)	−.30 (0.05)	.33 (0.07)	.48 (0.04)	NA	.60 (0.03)
	Positive	−.69 (0.06)	−.58 (0.06)	.05 (0.11)	−.92 (0.04)	.91 (0.01)	NA

Notes. [a]$\chi^2(19)=1665.53$*.
[b]$\chi^2(19)=1692.80$*.
[c]$\chi^2(19)=1846.85$*.
*Significant at $p < .01$.

APPENDIX B

TABLE B1
Bayesian Model Selection Separated for Three Waves: Comparison of Multiple Sets of Inequality Constrained Hypotheses

	Model Comparison					
	Wave 1		*Wave 2*		*Wave 3*	
Models	*BF*	*PMP*	*BF*	*PMP*	*BF*	*PMP*
Model 1						
1. A_{neg} or $M_{neg} \rightarrow M_{pos} > M_{neg}$ or $A_{neg} \rightarrow A_{pos}$	4.02	.801	3.25	.701	3.79	.496
2. A_{neg} or $M_{neg} \rightarrow M_{pos} < M_{neg}$ or $A_{neg} \rightarrow A_{pos}$	<0.01	<.001	0.39[b]	.084	<0.01	<.001
3. A_{neg} or $M_{neg} \rightarrow M_{pos} = M_{neg}$ or $A_{neg} \rightarrow A_{pos}$	<0.01	<.001	<0.01	<.001	2.86	.373
4. Unconstrained model	1[a]	.199	1[a]	.216	1[a]	.131
Model 2						
1. A_{neg} or $M_{neg} \rightarrow M_{neu} > M_{neg}$ or $A_{neg} \rightarrow A_{neu}$	<0.01	<.001	0.11	.001	0.08	.001
2. A_{neg} or $M_{neg} \rightarrow M_{neu} < M_{neg}$ or $A_{neg} \rightarrow A_{neu}$	<0.01	.001	2.77	.031	2.36	.042
3. A_{neg} or $M_{neg} \rightarrow M_{neu} = M_{neg}$ or $A_{neg} \rightarrow A_{neu}$	<0.01	.001	84.16	.956	53.30	.939
4. Unconstrained model	1[a]	.997	1[a]	.011	1[a]	.018
Model 3a						
1. $M_{pos} \rightarrow A_{pos} > A_{pos} \rightarrow M_{pos}$	0.01	.002	0.35	.063	<0.01	<.001
2. $M_{pos} \rightarrow A_{pos} < A_{pos} \rightarrow M_{pos}$	1.98	.632	1.66	.300	1.98	.661
3. $M_{pos} \rightarrow A_{pos} = A_{pos} \rightarrow M_{pos}$	0.14	.046	2.53	.457	0.02	.005
4. Unconstrained model	1[a]	.320	1[a]	.180	1[a]	.334
Model 3b						
1. $M_{neg} \rightarrow A_{neg} > A_{neg} \rightarrow M_{neg}$	2.01	.667	1.97	.587	1.79	.348
2. $M_{neg} \rightarrow A_{neg} < A_{neg} \rightarrow M_{neg}$	<0.01[c]	NA	0.02	.006	0.20	.039
3. $M_{neg} \rightarrow A_{neg} = A_{neg} \rightarrow M_{neg}$	<0.01	<.001	0.36	.108	2.15	.418
4. Unconstrained model	1[a]	.333	1[a]	.299	1[a]	.195

A, adolescent; M, mother; neg, negative emotional state; pos, positive emotional state; neu, neutral emotional state; BF, Bayes factor; PMP, posterior model probability.

[a]Unconstrained model is reference category.

[b]One out of two restrictions did not converge and was therefore deleted from the model.

[c]Restriction did not converge and was therefore deleted from the model, BF is close to 0.00.